Modern development studies as a resource for understanding working animal use in later human prehistory: the example of 4th-3rd millennium BC Mesopotamia

Volume II APPENDICES

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APPENDICES

LIST OF FIGURES, TABLES AND CHARTS IN VOLUME II

Appendix I: DETAILS OF MODERN STUDIES USED

Among the sources consulted for my thesis are 380 modern development studies; the chart in Appendix I.1 summarises their publication years. 265 of these have at least some sub-Saharan African focus, and their geographical distribution is summarised in the map in Appendix I.1, followed by a summary of the geographical focus of studies used, and in Appendix I.2 a list giving a brief paragraph on the content of each source.

Appendix I.1 Study dates and regions

Dates of modern studies

Chart 1 below summarises the publication dates of the 380 modern studies used from all regions worldwide.

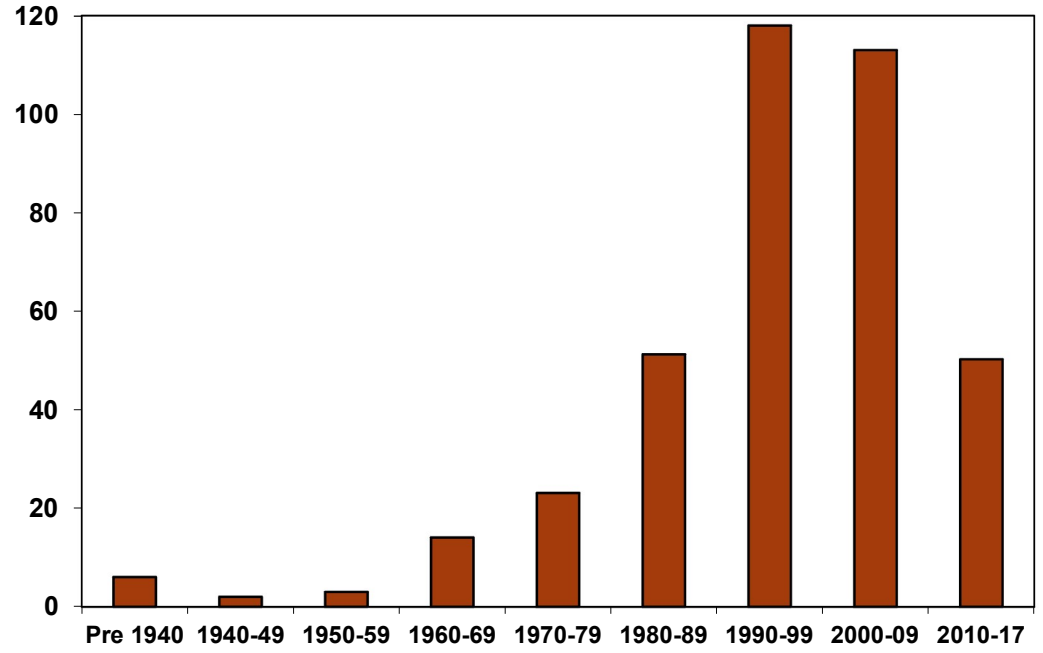

Chart 1: Publication dates of the modern/ ethnographic studies used (total 380; © Jill Goulder 2018)

Geographical regions of modern studies

Figure 62 indicates the distribution of the modern sub-Saharan African working-animal and other studies that I have used. Note that the incidence of studies reflects various factors such as official/ NGO focus, stability of government, presence of working animals, and also (for my using) language of publication (mainly English, French and Spanish).

Table 7 lists the modern studies used worldwide by country. Note that some studies cover more than one country or global region and are recorded under all relevant headings.

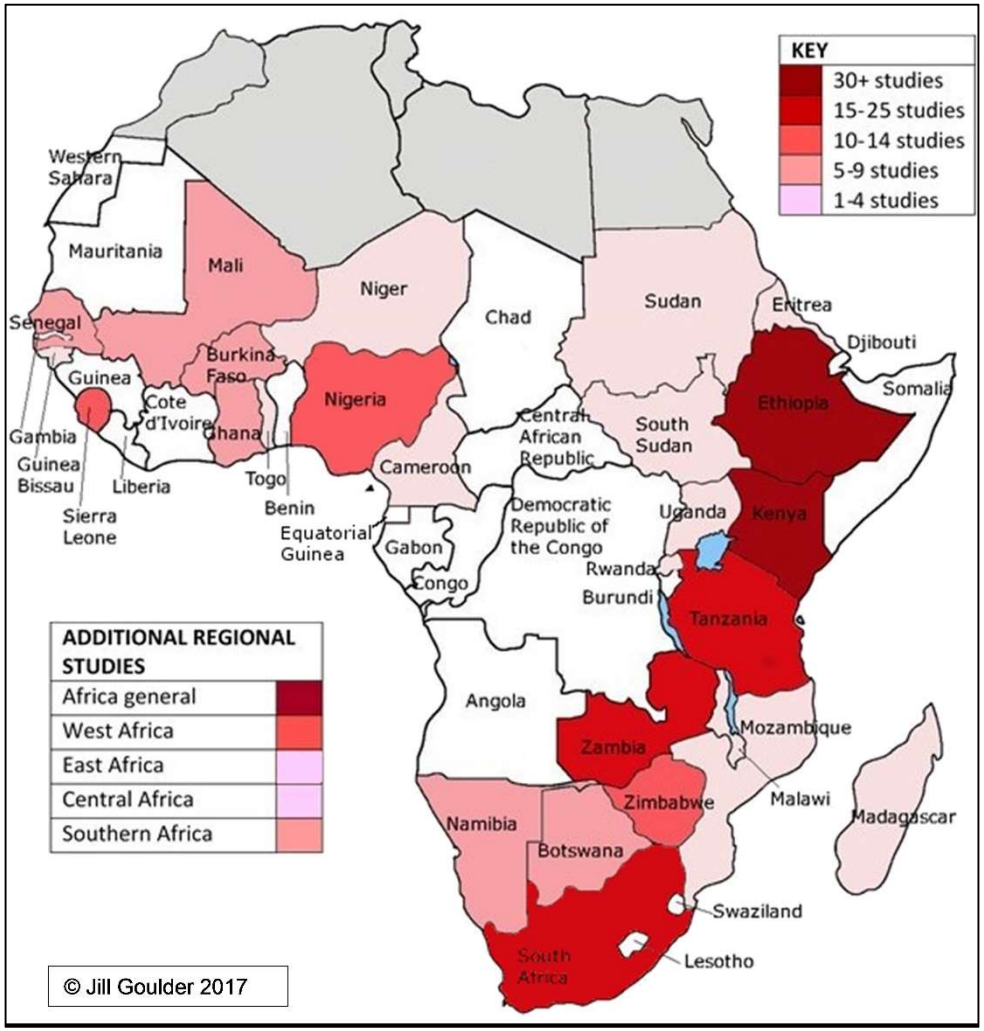

Figure 62: Distribution of modern studies in sub-Saharan Africa used (total 265; © Jill Goulder 2017)

Table 7: Modern studies used by country

	TOTAL
TOTAL	**380**
GENERAL/ GLOBAL	**14**
SUB-SAHARAN AFRICA TOTAL	**265**
Regional studies:	
Africa general	62
West Africa	11
East Africa	3
Central Africa	1
Southern Africa	6
Country studies:	
Botswana	6
Burkina Faso	6
Cameroon	1
Eritrea	2
Ethiopia	33
Gambia	1
Ghana	8
Guinea Bissau	1

	TOTAL
ASIA TOTAL	**49**
Asia general	9
Country studies:	
Bangladesh	1
China	7
India	17
Indonesia	1
Mongolia	4
Nepal	10
Pakistan	5
Tibet	3
NEAR EAST/ N. AFRICA TOTAL	**32**
Near East general	3
North Africa general	3
Country studies:	
Afghanistan	2
Arabia	2
Balochistan	1
Cyprus	2

	TOTAL
EUROPE/ EURASIA TOTAL	**31**
Europe general	3
Country studies:	
Britain	10
Czech Republic	2
France	3
Georgia	1
Greece	4
Scandinavia	4
Spain	1
Romania	1
Russia	1
Turkmenistan	1
NORTH AMERICA TOTAL	**10**
USA	10
Canada	1
LATIN AMERICA TOTAL	**15**
South/ Latin America general	3

	TOTAL
Kenya	31
Madagascar	1
Malawi	3
Mali	6
Mozambique	1
Namibia	5
Niger	2
Nigeria	10
Rwanda	1
Senegal	5
Sierra Leone	10
South Africa	15
Sudan	2
Tanzania	16
Togo	3
Uganda	4
Zambia	22
Zimbabwe	12

	TOTAL
Egypt	2
Iran	3
Iraq	4
Israel	1
Jordan	3
Lebanon	1
Morocco	2
Syria	2
Turkey	2

	TOTAL
Argentina	1
Bolivia	3
Cuba	1
Guatemala	4
Mexico	1
AUSTRALIA TOTAL	**2**
Australia	2

Appendix I.2 Content précis of the modern studies used

Table 8: Précis of contents of the modern studies used

Author	Date	Title	Summary
Abir, M.	1966	Salt, trade and politics in Ethiopia in the "Zämänä Mäsafent"	An account of the Ethiopian salt caravan trade in the 18th-19th century AD, involving donkeys, mules and porters; the key role of salt as a currency is underlined
Abu Sin, M.E.	1991	Transformation of camel breeding in the Sudan	Social structure of camel-breeding societies in Sudan
Admassu, B. and Shiferaw, Y.	2011	Donkeys, horses and mules - their contribution to people's livelihoods in Ethiopia	Study of the contributions of donkeys, horses and mules to human livelihoods in three woredas in Ethiopia. 528 individual household interviews and 30 focus group discussions; SPSS quantitative analysis
Admiralty War Staff	1916	A Handbook of Mesopotamia. Vol. 1 General	Includes information on breeding of donkeys in early 20th-century AD Iraq, and of their use in comparison with camels and boats
Aganga, A.A. and Seabo, D.	2004	A survey of donkey use by small-scale farmers in south-east Botswana highlighting gender differences	Results of a survey in SE Botswana of 65 draught animal-using farming households in 2 districts, with the aim of examining the gender distribution of use of draught cattle and donkeys
Aganga, A.A. and Tsopito, C.M.	2004	Donkey power technology in the Gaborone Region of Botswana	Interviews with 100 donkey-using small-scale farmers in 18 villages in the Gaborone region of Botswana about the adoption, uses and constraints to the greater use of draught donkeys
Aganga, A.A., Patrick, C. and Segwagwe, B.V.E.	2000	Animal traction technology in Botswana: potential and constraints	Overview of constraints to increased adoption of animal traction technology, in Botswana, and the potential for increased use of donkeys

Ahmadu, B., Chisenga, N. and Chipasha, P.	2000	Performance of donkeys as draught animals in Zambia: an overview	Account of the limited use of donkeys in Zambia compared with neighbouring countries
Aikio, P.	1989	The changing role of reindeer in the life of the Sami	Account by a former herder of a Finnish reindeer-breeding culture
Akila, N. and Chander, M.	2009	Farmers' attitude towards utilization of draught bullocks in Indian agriculture	Survey among 210 farmers from a range of farm sizes in Tamil Nadhu state in S India, to measure the attitude of farmers towards utilisation of draught bullocks in agriculture.
Akou, A.E.	1994	Improving animal traction technology in Uganda	Report on animal traction in Uganda
Ali-Nejadfard, F.	2000	Rural travel and transport and economic development: problems and prospects in rural Africa. Examples from Malawi and Zimbabwe	Overview of findings from several studies in Africa, by the World Bank and ILO in the 1990s in Africa (Ghana, Zambia, Tanzania, Burkina Faso, Malawi and Zimbabwe) after the failure of road-building programmes to catalyse rural development; the paper uses case studies from Malawi and Zimbabwe to indicate other solutions to rural access problems, for women in particular
Anderson, M. and Dennis, R.	1994	Improving animal-based transport: options, issues and impact	Description of animal transport options, issues and impact in sub-Saharan Africa
Andrianaivoarivony, R. and Starkey, P.	2003	Animal traction for transport in Madagascar	Overview of use of animal traction in Madagascar
Astatke, A. and Mohammed-Saleem, M.A.	1994	Experiences with the use of a single ox for cultivation in the Ethiopian highlands	Account of tests in highland Ethiopia on use of a single ox for ploughing, with a description of the ploughing practices in force
Audiot, A. and Garnier, J.-C.	1995	De l'An(e)onyme à l'hymne à l'âne ou le renversement de perspectives des usages sociaux de l'âne	Account of the social history of the donkey in Europe and the Near East

Ayo-Odongo, J., Mutyaba, C. and Kalunda, P.	2000	Improving on-farm transport using animal draught power in two hilly districts of Western Uganda	Account of the processes, methodologies and impact of the introduction of pack donkeys on the rural communities in two mountainous districts of western Uganda
Bangura, A.B.	1988	The utilization and management of draft animals at farm level	Findings from on-farm surveys of ox-ploughing in Sierra Leone
Bangura, A.B.	1990	Constraints to the extension of draft animal technology in the farming systems of Sierra Leone	Account of the results of a survey among different ethnic groups of farmers in Sierra Leone and the varying acceptance of work oxen
Bansal, R.K., Klaij, M.C. and Serafini, P.G.	1988	Animal traction in improved farming systems for the semi-arid tropics: the ICRISAT experience in India and West Africa	Overview of experimental researh by ICRISAT (International Crops Research Institute for the Semi-Arid Tropics) on the value of ox traction in agriculture, contrasting India (where animal traction is long-established) with West Africa where it was almost unknown until WWII
Barker, H.M.	1964	Camels and the Outback	Account of the operation of camels and other working animals in early 20th-century AD Australia
Barker, T.C.	1983	The delayed decline of the horse in the twentieth century	Account of the reliance of 19th- and early 20th-century AD Britain on the 'horse industry'
Barrett, V., Lassiter, G., Wilcock, D., Baker, D. and Crawford, E.	1982	Animal Traction in Eastern Upper Volta: a technical, economic, and institutional analysis	Detailed report on a major survey in eastern Upper Volta (now Burkina Faso) to determine the success and lessons of a programme to promote the use of animal traction. 480 users of hand hoes (355) and animal traction (125) in 27 villages were interviewed weekly over a period, and detailed stratification of replies was carried out by agro-climatic zone, economic zone, and usage of oxen or donkeys. Includes a history of the various drives to promote animal traction in the region in the mid-20th century AD
Bartholomew, P.W., Khibe, T. and Little, D.A.	1994	Effect of live weight and body condition on work output from draft oxen	Results of experimental work with working zebu oxen in Mali

Bastien, G.J., Schepens, B., Willems, P.A. and Heglund, N.C.	2005	Energetics of load carrying in Nepalese porters	The results of a survey of the physiological load-carrying capabilities of Nepali sherpas compared with Kenyan Kikuyu women
Berg, G.	1935	Sledges and Wheeled Vehicles: ethnological studies from the view-point of Sweden	A detailed account of traditional sledges, travois and carts in early 20th-century AD Scandinavia
Betker, J. and Kutzbach, H.-D.	1991	The role of donkeys in agricultural mechanization in Niger – potential and limitations	Account of the use of donkeys in Niger and comparison with cattle for traction
Binger, L.G.	1892	Du Niger au Golfe de Guinée par le pays de Kong et le Mossi	Account of the author's travels through West Africa in the late 19th century AD; includes mention of the breeding of donkeys by the Mossi, and the operation of the kola-nut trade
Blakeway, S.	2017	(pers. comm.)	Account of the ad hoc use of free-roaming donkeys in Kenya by Turkana pastoralists
Blench, R.M.	1997	Animal Traction in West Africa: categories, distribution and constraints on its adoption and further spread: a Nigerian case study	A detailed overview of the use and management of working camels, cattle and equids in Nigeria, and the potential for expansion of use
Blench, R.M.	2000	A history of donkeys, wild asses and mules in Africa	Account of early and present-day use of donkeys and mules in Africa, including information on their physiology suitability for the varying climatic zones
Blench, R.M., de Jode, A. and Gherzi, E.	2004	Donkeys in Nigeria: history, distribution and productivity	A survey on the use, management and reproduction of donkeys in north-western Nigeria
Bobobee, E.Y.H.	1999	Role of draft animal power in Ghanaian agriculture	Findings of an animal traction technology resource mapping study carried out in Ghana to establish a databank on numbers and distribution of draught animals and related infrastructure, supported by research among farmers on current and potential attitudes to and use of draught cattle

Bonnemaire, J. and Teissier, J.H.	1976	Quelques aspects de l'élevage en haute altitude dans l'Himalaya central: yaks, bovins, hybrides et métis dans la vallée du Langtang (Népal)	Account of farming in Nepal, and of use of yaks, zebu and taurines
Bradbury, H.	2010	A contextual overview of the use of draught animals in the Samstkhe Javakheti region of Georgia	Findings from field interviews with users of draught oxen in a rural region of Georgia, on their use and management
British Admiralty	1943	Great Britain. Naval Intelligence Division: Syria	Description of the use of cattle and donkeys in Syria in 1943
Brooke, R.J.	1999	Social networks and exchange	An account of the social networks and exchange activities of the Turkana herders in Africa
Bulliet, R.W.	1975	The Camel and the Wheel	Discussion of the history and more recent traditional use and management of camels in northern Africa, Arabia and India
Bwalya, G.M.	2004	Donkey promotion in Western Province, Zambia	An account of the limited success of introduction of draught oxen technology to women farmers and other under-resourced groups in a predominantly cattle-keeping area of Zambia where oxen are generally managed by men and the soil is sandy and poor, and the greater success of the promotion of use of donkeys
Bwalya, G.M. and Akombelwa, M.	1999	Animal traction development and gender: experiences from Western Province, Zambia	An account of the introduction of draught oxen technology to women farmers and other under-resourced groups in an area of Zambia where oxen are generally managed by men
Bwalya, M.	1999	Conservation farming with animal traction in smallholder farming systems: Palabana experiences	An account of on-farm trials of conservation tilling in Zambia
Cable, M. and French, F.	1950	The Gobi Desert	An eyewitness account, republished from earlier material, of desert caravans and local transport in 1920s/30s AD western China, noting the invaluable role of donkeys for local transport

Campbell, B.	2005	On 'loving your water buffalo more than your own mother': relationships of animal and human care in Nepal	Account of pack and traction animal use and management in Nepal
Canacoo, E.A.	2004	Utilisation of donkeys in southern Ghana	A study of current and potential donkey utilisation in southern Ghana using records of donkeys sold by the Animal Traction Project, which aims to increase donkey usage in this region
Carswell, G.	1997	Agricultural Intensification and Rural Sustainable Livelihoods: a 'Think Piece'	Discussion of the promotion of advanced agriculture in sub-Saharan Africa
Castel Carpinschi, C.	2003	Le choix des techniques d'égrenage "pré-machinistes" en France (1786-1950)	Account of animal traction for threshing in 19th-century and early 20th-century AD in France
Catley, A. and Blakeway, S.	2004	Donkeys and the provision of livestock to returnees: lessons from Eritrea	Results of a preference and usage survey in three provinces in Eritrea among 2090 refugee households returning from Sudan and provided with livestock including donkeys as part of a resettlement package
Chadborn, A.	2008	Low-cost donkey harness from experience in Uganda	The role of harness in use of donkeys and cattle in Uganda
Charles, M.P.	1990	Traditional crop husbandry in southern Iraq, 1900-1960 AD	An account of extensive and intensive farming in early 20th-century AD Iraq and a discussion of the applicability of the findings to the situation in ancient Sumeria
Chelemu, K. and Nindi, P.	1999	Conservation tillage for soil and water conservation using draft animal power in Zambia	An account of the development of conservation tilling in Zambia
Chikura, S.	1994	Improving the management of feed resources for draft animals in Mangwende, Zimbabwe	Account of the feed resources for draught animals in a region of Zimbabwe
Chivers, K.	1983	The supply of horses in Great Britain in the nineteenth century	An account of horse-breeding in 19th-century AD Britain

Clark, C. and Haswell, M.R.	1970	The Economics of Subsistence Agriculture	Discussion of transport method viability in modern Africa, including summary of factors and detailed capacity comparisons worldwide between human porterage, animals, carts and boats
Clutton-Brock, J.	2012	Animals as Domesticates: a world view through history	Brief history of domesticated animals in Africa, including the first use of working animals imported by Europeans
Cochin, J.	1995	L'Ane au Senegal et au Burkina Faso	Detailed account of the usage and management of equids and working cattle in Senegal and Burkina Faso
Cole, G.O. and Steinbach, J.	1999	Comparative draft performance of oxen and heifers in northern Sierra Leone	A comparison of male versus female cattle for draught in northern Sierra Leone
Collins, E.J.T.	1983	The farm horse economy of England and Wales in the early tractor age 1900-40	Account of the use and management of draught horses in urban and rural environments in early 20th-century AD Britain
Comaroff, J.	1985	Body of Power Spirit and Resistance: the culture and history of a South African people	A detailed account of the Barolong boo Ratshidi, a cultural group in the South Africa/ Botswana border area, from the 19th century AD to recent times. Among other major themes are the role of cattle in enabling men and excluding women, for example from ploughing and wealth
Coppock, D.L., Ellis, J.E. and Swift, D.M.	1986	Livestock feeding ecology and resource utilization in a nomadic pastoral ecosystem	Account of the livestock-keeping activities of Turkana pastoralists, including findings from an in-depth survey in 1981/2 among 4 households in NW Kenya; the results illustrate how the differing foraging strategies of cattle, donkeys and other animals interlock to achieve equitable use of all forage resources
Crane, M.	2011	Knowing more about working animal populations	Preliminary results of a questionnaire-based survey among users of working equids in Xinjiang, China and Khenifra, Morocco
Daborn, C.	2011	Bringing draft animal power into the 21st century	Account of the renewed move towards draught animal power in Kenya
Dahl, G. and Hjort, A.	1976	Having Herds: pastoral herd growth and household economy	Discussion of the use and management of cattle and camels in traditional societies
Dahl, G. and Hjort, A.	1984	Dromedary pastoralism in Africa and Asia	Description of camel-keeping by pastoralists in Africa and Asia

Daramola, A.G.	1999	The potential for animal traction in south-western Nigeria	Discussion of the cultural and social barriers to animal traction adoption in south-western Nigeria
de Aluja, A.S. and Lopez, F.	1991	Donkeys in Mexico	Account of the use of donkeys in Mexico
de Planhol, X.	1969	Le boeuf porteur dans le Proche-Orient et l'Afrique du Nord	An overview of the use of oxen for pack and riding in the Near East and North Africa, including a critique of the findings on this subject of Lindblom 1931
de Wilde, J.C.	1967	Experiences with Agricultural Development in Tropical Africa. Vol. I: The synthesis	Account of the role and potential of working animals in tropical African agriculture
Delgado, C.L. and McIntire, J.	1982	Constraints on oxen cultivation in the Sahel	Comparison of the results of two surveys on use of animal traction, one among 41 oxen-using farms in south-eastern Burkina Faso (former Upper Volta) and one among 152 households in Segou in Mali, to examine why farmers in some areas of tse-tse-free West Africa have rapidly adopted animal traction using oxen in recent years (as in Mali), while most cultivators in the dry, savannah areas of the coastal states and the Sahelian nations, as in Burkina Faso, have not
Denis, B.	1995	Etude zootechnique de l'âne en France: aspects historiques	Account of the breeding and use of donkeys in France in the late 19th and early 20th centuries AD
Dennis, R.	1996	Guidelines for Design, Production and Testing of Animal-Drawn Carts	Discussion of the use of donkeys and donkey-carts in various world regions
Dennis, R.	1999	Meeting the challenge of animal-based transport	Account of the use of donkeys and oxen for transport in various African countries
Dennis, R. and Smith, A.	1995	Low-Cost Load-Carrying Devices: the design and manufacture of some basic means of transport	Discussion of the comparative advantages of oxen and donkeys for pack and hauling sledges, with a comparison with human porterage in various regions
Dent, A.	1972	Donkey: the story of the ass from East to West	Account of the use of pack mules by the US Army, and of pack donkeys in various regions

Desai, K. and Salgar, S.B.	2010	Changing practices with working bullocks: using the morkee instead of the nose rope	Discussion of the management of working bullocks in India
Desta, K.	1994	Development and transfer of animal traction technology in Ethiopia	Discussion of animal ploughing technology in Ethiopia
Digard, J.P.	1982	Techniques des nomades Baxtyari d'Iran	Account of human porterage and use of pack donkeys and mules by the Baxtyari nomads of Iran
Dijkman, J. and Sims, B.	2004	From beast of burden to multi-purpose power source: challenges for the use of donkeys in Bolivia	Part of the results of a Participatory Rural Appraisal on the availability, use and management of work animals, particularly donkeys, in the middle Andean hills of Bolivia. The study was conducted in six communities in three provinces of Cochabamba Department in Bolivia, using historical transects, community mapping, seasonal calendars, mobility maps, resource flow diagrams and matrix and problem ranking were used
Dijkman, J., Gebre Wold, A. and Pearson, R.A.	2000	Multipurpose use of work animals in smallholder farming systems	Comparison of the advantages of working oxen versus cows in Africa
Dixit, K.M.	1995	The porter's burden	Results of a conference in Nepal on Himalayan porterage, including social and physical consequences and the threat from yak and mule trains
Doran, J.	1994	Transportation by women, and their access to animal-drawn carts in Zimbabwe	Discussion of women and animal-based transportation in Zimbabwe
Doumbia, A.	2014	The contribution of working donkeys to the livelihoods of the population in Mali	A summary of the findings from a study of the role of working donkeys in Segou in central Mali, based on interviews with 1,044 families using donkeys in the Segou region. In addition, 350 donkey-owners in various regions of Mali were interviewed about the financial income from donkeys
Downs, J.F. and Ekvall, R.B.	1965	Animals and social types in the exploitation of the Tibetan plateau	Account of the use and management of pack yaks and dzos (yak-cow hybrids) in Tibet, including a description of the specialist dzo-breeding cultures supplying and providing services for the pack-trains

Edwards, P.R.	1983	The horse trade in Tudor and Stuart England	Description of the horse supply industry in 16th-17th century AD England
Evans, G.E.	1960	The Horse in the Furrow	Account of ox, horse and donkey traction in early 20th-century AD Britain
Evenari, M., Shanan, L. and Tadmor, N.	1971	The Negev: the challenge of a desert	Description of the physiological suitability of camels for an arid region of the southern Levant
Ewers, J.C.	1955	The Horse in Blackfoot Indian Culture	Detailed account of the use by native American cultures in the 18th-20th centuries AD of (female) porterage and of the adoption of the horse for riding and hauling travois, including material from interviews in the 1940s with elderly Blackfoot native Americans
Faftine, O. and Mutsando, A.	1999	Cow traction in Chokwe, Mozambique	Results of a survey among 60 farmers who were ploughing with cows in the Chokwe District in Gaza, Mozambique. The histories of 110 cows raised primarily for breeding purposes but used also for traction were obtained from the owners.
Fahmy, S.W.	2004	The health and husbandry of donkeys used by Zabbalin rubbish collectors in Cairo, Egypt	An assessment of the health and management of donkeys used by Zabbalin rubbish collectors in Cairo, Egypt
Fall, A. and Faye, A.	1999	Minimum tillage for soil and water management with animal traction in the West-African region	An overview of several research studies in various countries in West Africa, in particular in Senegal, on the utilisation levels of animal traction for better soil and water management, through conservation tillage
Fall, A., Fall, A., Diack, A. and Dia, F.	2003	The role of work animals in semi-arid West Africa: current use and their potential for future contributions	Account of the introduction of animal traction in Senegal and other semi-arid West African countries, with differing outcomes resulting from different cultures, climate, terrain, crops and official intervention
Farnham, D.A.	1997	Plows, Prosperity and Cooperation at Agbassa: the change from hoes and plows on a government-sponsored land settlement project in northern Togo	A comprehensive overview of the use of animal traction in Africa, as an introduction to a detailed report on a programme of fieldwork in 1985-7 in Agbassa in the Kara Valley in N Togo. More than 80% of the farmers, from 2 ethnic groups and totalling more than 100, were interviewed at intervals about their farming practices and experiences, with archival research and other interviews and observations in addition

Feh, C., Shah, N., Rowen, M., Reading, R. and Goyal, S.P.	2002	Status and action plan for the Asiatic wild ass (*Equus hemionus*)	Summary of the status of the Asiatic hemione
Ferdinand, K.	1962	Nomadic expansion and commerce in Afghanistan	Description of the major animal-trading bazaars in Afghanistan
Fernando, P. and Starkey, P.	2004	Donkeys and development: socio-economic aspects of donkey use in Africa	An overview of research into socioeconomic aspects of donkey use in Africa
Fielding, D.	1987	Donkey power in African rural transport	Account of the social and developmental importance of the donkey for rural transport in Africa, and for cultivation in areas with light, sandy soil
Fielding, D. and Krause, P.	1998	Donkeys	Comparison of donkeys, horses and cattle for work in Africa and elsewhere
Finkelstein, I.	1995	Living on the Fringe: the archaeology and history of the Negev, Sinai and neighbouring regions in the Bronze and Iron Ages	A note on the use of camels for ploughing in the Negev in the early 20th century AD, and of camels and donkeys for water-carrying
Fisher, J.F.	1990	Sherpas: reflections on change in Himalayan Nepal	Account of the use of sherpas and dzos for pack in Nepal
Floor, W.	2003	Agriculture in Qajar Iran	Account of agriculture in 18th-early 20th century AD Iran
Förster, F., Riemer, H. and Mahir, M.	2013	Donkeys to El-Fasher or how the present informs the past	Account of a rare fortuitous meeting with a donkey caravan in Sudan, and of interviews with the caravan individuals and others. Continues with accounts of other donkey caravans in N sub-Saharan Africa
Fowler, R.	1999	Animal draft power in South Africa: past, present and future	A brief history of animal transport and traction in South Africa, from before the arrival of European settlers in the 1600s to the present, with an account of the luring of users into mechanical power and of official scorn for 'old-fashioned' animal power, though it is still widely used

Francis, J., Mudamburi, B. and Chikwanda, B.	1999	Animal draft power challenges in Zimbabwe	A review of the availability of animal draught power in Zimbabwe's communal farming areas, and of research conducted to date
Fürer-Haimendorf, C. von	1984	The Sherpas Transformed: social change in a Buddhist society of Nepal	Account of the culture and working practices of the Sherpa porters in Nepal
Gauthier-Pilters, H. and Dagg, A.I.	1981	The Camel: its evolution, ecology, behavior, and relationship to man	Account of the use and management of pack camels in the Near East, Africa and Australia
Gboku, M.L.S.	1988	Farmer social variables influencing the adopting of agricultural innovation in Sierra Leone	An analysis of social characteristics of oxen farmers in Sierra Leone and their relevance to adoption of animal traction
Gebre Wold, A., Tegegne, A. and Yami, A.	2004	Research needs of donkey utilisation in Ethiopia	Background information for a proposal for research into the current and potential use of donkeys in Ethiopia
Gebreab, F.	1992	Horses, donkeys and mules in Ethiopia: role in agricultural development and major problems	History and account of the role of horses, donkeys and mules in Ethiopia
Gebreab, F.	1998	Donkey utilisation and management in Ethiopia. Points from the keynote presentation by F. Gebreab based on the paper prepared by F. Gebreab, A. Gebre Wold, F. Kelemu, A. Ibro and K. Yilma	Description of the use and management of donkeys for transport in Ethiopia
Gebreab, F., Gebre Wold, A., Kelemu, F., Ibro, A. and Yilma, K.	2004	Donkey utilisation and management in Ethiopia	Results of studies in Ethiopia on use and management of donkeys on farms and for household work, including observations of donkey traffic on the main roads into Addis Ababa and the balance between human porterage and donkey pack

Gil Montero, R.	2009	Mountain pastoralism in the Andes during colonial times	Description of the social change resulting from a shift from llamas to mules for pack trains in colonial Mesoamerica
Gourou, P.	1961	The Tropical World: its social and economic conditions and its future status	History of early 20th-century AD cultivation and porterage in Africa
Hagmann, J. and Prasad, V.L.	1995	Use of donkeys and their draught performance in smallholder farming in Zimbabwe	Results from a detailed project examining the use, management and capabilities of donkeys in two semi-arid districts of Zimbabwe; the project comprised interviews with 59 smallholder farmers owning and using donkeys for agricultural work, and an on-farm comparative trial of donkeys and cattle for ploughing
Hailu, Z.	1990	The Adoption of Modern Farm Practices in African Agriculture, Empirical Evidence about the Impacts of Household Characteristics and Input Supply Systems in the Northern Region of Ghana	Findings from a study of bullock traction in northern Ghana, involving interviews with owning and non-owning farmers as to the reasons for adoption or non-adoption
Halstead, P.	1987a	Traditional and ancient rural economy in Mediterranean Europe	An overview of traditional agriculture in Mediterranean Europe with lessons for the study of agriculture in antiquity
Halstead, P.	2005	Herders and farmers in the Pindos mountains of NW Greece: interdependence, identity and the antiquity of pastoralism	Account of the complex interrelations of farmers and different pastoralist types in modern north-west Greece
Halstead, P.	2014	Two Oxen Ahead: pre-mechanized farming in the Mediterranean	Ethnographic account of oxen and donkeys in traditional modern Greece and the impact on models of practices in antiquity

Halstead, P. and Isaakidou, V.	2011	Revolutionary secondary products: the development and significance of milking, animal-traction and wool-gathering in later prehistoric Europe and the Near East	A reassessment of the practicalities of the secondary products revolution model proposed by Sherratt, based on conversations with farmers in modern rural Mediterranean regions on factors in adoption and use of animal ploughing and transport and of the animals employed
Halstead, P. and Jones, G.	1989	Agrarian ecology in the Greek islands: time, stress, scale and risk	Findings from a botanical study of crop processing on the southern Aegean islands of Karpathos and Amorgos and the implications on the wider agricultural economy of the time stress, scale and risk involved in traditional farming practices
Hämäläinen, P.	2008	The Comanche Empire	An account of the 18th-century AD Comanche Native American society, including their large-scale horse-raiding activities and use of women for work
Hamid, E.	2004	The importance of donkeys in a restocking programme in Eritrea	A study in Eritrea on the impact of donkey usage on workload and income in the rural economy, including returning refugees from Sudan, and the limiting factors to donkey usage, including the technical and social changes required for realisation of the potential of this new asset. 5,000 returnee households were monitored as to their livestock choices and the reasons given by those preferring donkeys
Hanekom, D.	2004	The use of donkeys for transport in South Africa	An overview of the current and potential use of donkeys for cart, sledge and pack transport in South Africa
Hanjra, S.H. and Lateef, M.	1993	The role and management of herbivores for draught animal power in Pakistan	Summary of management of working animals in Pakistan
Hassan, A.W. and Ibitoye, B.A.	1993	Camels and donkeys as pack and transport animals in semi-arid northern Nigeria: herd composition, management and utilisation	Results of a survey of 201 camel and donkey owners in northern Nigeria, covering use and management of pack animals

Haufiku, N., Naunyango , S.and Rigourd, C.	2004	Donkey traction in north central Namibia	A review of donkey use in the farming systems of northern Namibia, particularly by women, and of the under-utilisation resulting from economic, social and technical constraints. Regional variations - such as donkeys used for ploughing in some regions and not others - are discussed
Havard, M., Vall, E., Njoya, A. and Fall, A.	2007	La traction animale en Afrique de l'Ouest et du Centre	A summary of the variations in use of animal traction by region in West and Central Africa, categorised by tsetse infestation and levels of aridity/ humidity
Henriksson, M. and Lindholm, E.	2000	The Use and Role of Animal Draught Power in Cuban Agriculture: a field study in Havana Province	Report on results of semi-structured interviews with animal traction-using and non-using farmers, farming families, members of rural communities and other stakeholders in Cuba, concerning the key factors for small farmers in the development of animal traction
Hering, R. and Greeley, S.A.	1921	Collection and Disposal of Municipal Refuse	Account of the urban horse industry in early 20th-century AD Boston in USA
Hesse, J.H. and Runge-Metzger, A.	1999	Ox traction in a long-term perspective: policy implications of a socio-economic study in Ghana	Findings from a study of changes in the pattern of use of ox-traction technology in farming systems, conducted in 1982-3 among 42 households in northern Ghana and repeated among the same households in 1993-5. A particular finding is the importance of renting oxen
Hole, F.	1978	Pastoral nomadism in western Iran	Account of the use of equid and human pack and cultivation power by modern nomads and farmers in western Iran
Ingold, T.	1980	Hunters, Pastoralists and Ranchers: reindeer economies and their transformations	Detailed account of the use and management of reindeer for pack and hauling sledges in Lapland, including a history of working animals in various cultures
Inns, F.M.	1980	Animal power in agricultural production systems	Description of the use and management of draught donkeys and oxen in Africa and elsewhere
Isaakidou, V.	2011	Gardening with cows: hoe and plough in prehistoric Europe	Field study of the use of draught cows in modern Greece and Spain, for application in a new model of agricultural change in Neolithic Mediterranean Europe
Islam, A.W.M.S.	1993	Draught animal power in Bangladesh	Overview of the use of cattle and buffalo for work in Bangladesh

Izard, M.	1971	Les Yarse et le commerce dans le Yatênga pré-colonial	Findings from a study of Yarse donkey-caravan systems in Burkina Faso and neighbouring countries
Jabbar, M.A.	1993	Research on cow traction in Africa: some lessons to be learnt	Discussion of the use of oxen vs. cows for traction in Ethiopia
Jacobs, A.H.	1975	Maasai pastoralism in historical perspective	Description of the use of donkeys for pack by the pastoral Maasai in Kenya and Tanzania
Jacobs, N.	2001	The Great Bophuthatswana Donkey Massacre: discourse on the ass and politics of class and grass	Account of the killing by the South African government of 20,000 donkeys in 1983, as part of a colonial emphasis on cattle use, and of the cultural and economic outcome for women and other donkey-users
Jaeger, W.K. and Matlon, P.J.	1990	Utilization, profitability, and the adoption of animal draft power in West Africa	Analysis of farm-level studies of the household and practical reasons why farmers in West Africa's semi-arid tropics have been slow to adopt animal draft power to replace manual cultivation, defying the logic of conventional choice-of-technique analyses; the farming activities of 50-60 households were monitored in each of six regions in Burkina Faso, covering the main climatic zones
Jepson, P.	1994	Military pack transportation	Description of the weight-carrying ability of British Army pack donkeys, and elephants
Jest, C.	1976	L'Elevage du yak dans l'Himalaya du Nepal	Account of the nomadic breeders of yaks
Jest, C. and Ravis-Giordani, G.	1985	L'Ane au Tibet	Account of the use of donkeys in Tibet
Johannsen, N.N.	2011	Past and present strategies for draught exploitation of cattle	Overview of systems for modern use of draught cattle, using examples worldwide to present challenges to the established archaeological models of their usage in antiquity
Jolly, C.M. and Gadbois, M.	1996	The effect of animal traction on labour productivity and food self sufficiency: the case of Mali	Analysis of the effects of animal traction on labour productivity on farms in seven villages in south central Mali, from interviews with 73 farmers and personal observation

Jones, P.A.	1991	Overcoming ignorance about donkeys in Zimbabwe – a case study	Discussion of the cultural barriers to adoption of donkey power in Zimbabwe
Jones, P.A.	2000a	Calculating the true costs of donkey ownership	Discussion of the management of donkeys in Africa
Jones, P.A.	2004	Response to demand: meeting farmers' need for donkeys in southern Africa	Discussion of the reasons for the increasing demand for donkeys in southern Africa - practical and cultural factors
Jones, P.A.	2008a	Major differences between work animals and food animals	Discussion, based on African experience, of differences in management of donkeys and other work animals vs. management of food animals
Jones, P.A.	2008b	Why donkeys should work	Discussion of use and management of donkeys in Africa
Jones, P.A.	2009	Adaptation in donkeys	Growing demand for donkeys in Africa is leading to an increase in the transfer of donkeys between countries. Account of 3 examples (Zimbabwe arid plateaux to Zambia river valleys, Zimbabwe tropical river valley to South Africa mountain region, Swaziland mountain region to Mozambique coastal area; 121 donkeys in total) and the effects of the new environments - physiological adaptation, insects/ parasites, food plants, general adaptation
Jones, P.A.	2010	Changing attitudes towards donkeys in southern Africa	Description of cultural prejudice against adoption of donkey power in southern Africa
Jones, P.A.	2011	Comparative costs of animal work	Comparison of donkey, oxen, human and tractor working costs, including handlers, in southern Africa
Jotheri, J.	2014	(pers. comm.)	Account of use of donkeys in present-day southern Iraq
Joubert, B.	1995	An historical perspective on animal power use in South Africa	A detailed historical description of the early use of animal traction in South Africa, with records dating from the first European arrivers in 1488 AD noting the use of cattle for pack by indigenous inhabitants. The account continues with the arrival of settlers in the 17th century AD bringing donkeys and mules, though without their major use until the late 18th century AD. A detailed account of the trekkers is given. The account ends with mechanisation and the decline in use and status of working animals

Joubert, B. and Kotsokoane, J.	2000	Animal traction in South Africa into the 21st century	Comparison of the advantages of oxen versus donkeys in South Africa
Kakwaba, K. and van Leeuwen, M.	1999	Hiring and lending of oxen for plowing in Kaoma, Zambia	Results of interviews with 152 ox-owning and non-ox-owning households in a region of Zambia, on the subject of ox hiring and lending arrangements
Kalawoun, N.	2016	Can Lebanese donkeys survive urban expansion and social derision?	Account of the situation of donkeys in modern Lebanon
Kandpal, D.K., Zaman, S.F. and Kumar, A.	2014	Study on the contribution of equids to the livelihoods of landless people in Indian brick kilns	Report on a survey in Uttar Pradesh in 2013 among 200 equid-owners working at brick-kilns, using interviews, focus groups and other research approaches. The survey underlined the financial importance of brick-carrying to these owners, especially as often no work is available outside the brick-making season
Kanu, B.H.	1988	Animal traction development strategies in Sierra Leone	An account of the constraints to and potential for the development of work oxen in Sierra Leone; findings from several initiatives and surveys are reported, including a study of the use of 44 pairs of working oxen in the Mabole Valley region with an in-depth analysis of five farm households, of the use of 32 pairs of working oxen introduced into the Bombali region, and of the results of an oxen loan scheme
Kanu, B.H.	2000	Farm-level economic benefits of using oxen for plowing and weeding in Sierra Leone	Account of field trials of N'dama (taurine) oxen in Sierra Leone as part of a drive to increase animal traction in the country, with budget comparisons with hand and tractor usage
Kaoma-Sprenkels, C., Stevens, P.A. and Wanders, A.A.	1999	IMAG-DLO and conservation tillage: Activities and Experiences	Account of on-farm conservation tillage research in Zambia
Karim-Sesay, J.A.	1999	Draft animal power potential and utilisation in the Tonota District of Botswana	Results of a survey of 9 areas in the Tonota district of Botswana on working animal ownership and usage, using data from records supplemented by interviews with 10 farmers

Kauffman, K.	1993	Why was the mule used in Southern agriculture? Empirical evidence of a principal-agent solution	Analysis of data on mule usage in 1920 on plantations in Georgia, relating it to presence of sharecroppers and the consequent need for hardier animals for use by those without an interest in limitation of capital depreciation of workstock
Kaumbutho, P., Waithanj, E. and Karimi, A.	2004	Donkey power in the context of smallholder mechanisation and agribusiness in Kenya	Analysis of case studies, field observations and interviews with farmers and fuel-wood and water carriers in Kenya in relation to use of donkey power
Kaumbutho, P.	2003	Recent developments in the role of equines in transport: experiences from Africa	Discussion of new opportunities for donkey traction in Africa
Kelekna, P.	2009	The Horse in Human History	History of the use of horses worldwide, including an account of pack-horses in 2nd-millennium AD Europe and of porters and llamas in Mesoamerica
Kendagor, M. and Njoroge, P.	2014	The contribution of donkeys to the livelihoods of the marginalised population in Kenya	Account of a study in a region of Kenya using a focus group of 15 women, with the aim of determining the financial contribution of donkeys to marginalised populations such as women
Kerman, C.	1985	Charrues et traction animale	Comparison of working oxen and donkeys in Africa
Kilemwa, A.M.	1999	Environmental impact of animal traction in Rukwa Region, Tanzania	Findings from surveys on the consequences of traction animal adoption in the Rukwa region of Tanzania
King, G.	2014	The DISPERSE Edaphics Project, Kenya	Results of a soil survey in Kenya indicating that herders, and animals themselves, seek out grazing offering necessary trace elements
Kjaerby, F.	1993	Problems and contradictions in the development of ox-cultivation in Tanzania	Report, based on a literature review, on the shaky development of ox-ploughing in Tanzania, including an account of the very unsuccessful Government drive to promote tractor ploughing in the 1960s. Includes a summary of the history of animal ploughing in sub-Saharan Africa

Kleene, P. and Vall, E.	2005	Animal traction in West and Central Africa: how to proceed after the disengagement of the State?	Summary of findings from a four-year research programme in the West and Central African savannah regions on the consequences of withdrawal of central support services for animal traction. The research was conducted in the three contrasting regions of N Cameroon (animal traction developing), Senegal (well-established animal traction) and eastern Burkina Faso (high demand from a small base)
Köhler-Rollefson, I.	2016	Banjaras, bullocks and biocultural protocols	An account of threatened livelihoods in the Maharashtra region of India, among the Banjara female cattle-breeders, of a nomadic tribe formerly specialising in long-distance transport of goods
Kramarik, J.	1975	L'histoire de l'attelage comme facteur et témoin du développement ethnique, économique et social	Account of harnessing of working animals in 16th-19th century AD Czech Republic and the implications for use
Krause, P.	1995	Harnessing donkeys for cart work	Account of use of donkeys for pulling carts in Africa
Kreike, E.	2010	Deforestation and Reforestation in Namibia: the global consequences of local contradictions	Findings of a survey among 115 households in Namibia on use and management of donkeys, and an account of their introduction into N Namibia in place of ploughing cattle from the 1950s, despite official objection
Kruit, F.	1994	Animal traction technology in Niger and some implications for Zambia	A summary of the use of animal traction in various climatic regions of West Africa, with a history of the adoption of animal traction in Niger and its current potential, with comments on the relevance for animal traction in Zambia
Kumwenda, W.	2004	Factors affecting the efficient use of donkeys in Malawi	A review of the use of draught animal power in Malawi and the potential for greater use of donkeys
Kumwenda, W. and Mayeyo, L.	1991	The potential and utilisation of the donkey in Malawi	Account of the use of donkeys in Malawi
Landais, E. and Lhoste, P.	1990	L'association agriculture-élevage en Afrique intertropicale: un mythe techniciste confronté aux réalités du terrain	An analysis of the unsuitability of the long-used model of animal traction in Africa based on fodder-growing and a link between agriculture and animal husbandry; examples are given from Francophone Africa

Langdon, J.	1986	Horses, Oxen and Technological Innovation: the use of draught animals in English farming from 1066 to 1500	Description of the use of traction horses and oxen in 11th-15th century AD England
Langha, K.	1999	Evolution of farming systems and the adoption and profitability of animal traction: a case study from the savanna highlands of North West Cameroon	Case study of the adoption and profitability of animal traction in north west Cameroon
Larsen, C.E.S., Kumsa, T. and Tegegne, A.	2003	Adoption of dairy-draught technology in a mixed crop/ livestock farming system – a case study from Ethiopia	Case study of the use of cows for draught in Ethiopia
Lattimore, O.	1928	The Desert Road to Turkestan	Account of camel management by early 20th-century AD caravaneers in China and Mongolia
Lattimore, O.	1941	Mongol Journeys	Account of camel management by early 20th-century AD caravaneers in China and Mongolia
Laurent, C.K.	1968	The use of bullocks for power on farms in northern Nigeria	Study of the use of and management of bullocks for ploughing in northern Nigeria, and barriers to expanded use
Lawrence, P.R. and Pearson, R.A.	2002	Use of draught animal power on small-scale mixed farms in Asia	A general method for assessing the profitability of draught animals in Asia is discussed, with a summary of draught animal usage and examples of draught animal use in small-scale farming systems in Indonesia and Nepal
Lekezime, P.	1988	Mechanical weeding with animal traction: some prerequisites	An assessment of the use and potential of animal traction for weeding in a region of Togo
Levinson, M.	2006	The Box: how the shipping container made the world smaller and the world economy bigger	Account of the change in use of human labour and local transportation with the advent of containerisation in the modern Western world

Leyland, J.	2004	The use of donkeys for transport in Kajiado, Kenya	Findings and recommendations from a study in five Maasai villages in Kajiado District, Kenya, of Maasai pastoralists' transport practices and the potential for improvement particularly with regard to women's work
Lhoste, P.	2004	La traction animale en Afrique subsaharienne: histoire et nouveaux enjeux	A detailed account of the development of animal traction in subsaharan Africa
Lindblom, K.G.	1931	The Use of Oxen as Pack and Riding Animals in Africa	Detailed account of the use of oxen for pack and riding in early 20th-century AD Africa
Little, M.A., Dyson-Hudson, R. and McCabe, J.T.	1999	Ecology of South Turkana	Description of the management of donkeys and other working animals by the Turkana in Kenya
Lombe, M., Sikanyika, C. and Tembo, A.N.	1994	The importance of women's participation in animal traction in Zambia	Description of animal traction in Zambia and the impact on the lives of women
Long, N.	1968	Social Change and the Individual: a study of the social and religious responses to innovation in a Zambian rural community	Account of agriculture in a region of Zambia in the 1940s and the development of use of draught animals
Low, A.	1986	Agricultural Development in Southern Africa	Account of agriculture in southern Africa
Lubumbe, S.L.	1994	Transfer of animal traction technology in Luapula Province, Zambia	Account of a study of the use of animal traction in a province in Zambia
Lubwama, F.B.	2000	Gender issues in animal traction and rural transport in Uganda	Historical background to the use of animal traction in Uganda, with recent developments and discussion of the issues of empowering women farmers through animal traction

McCann, J.	1984	Plows, Oxen, and Household Managers: a reconsideration of the land paradigm and the production equation in northeast Ethiopia	A survey of agriculture in NE Ethiopia in the 1800s - early 1900s AD. Oxen were essential for the heavy soils, but difficult to breed in the climate, so were imported from elsewhere in exchange for salt from Tigray. Several complex loan arrangements were in place for oxen and land. Account of feeding of oxen
McCann, J.	1995	People of the Plow: an agricultural history of Ethiopia, 1800-1990	Detailed description of the agricultural history of Ethiopia, 1800-1990, featuring the social and economic impact of the 'ox-plow complex' with the marasha ard-plough
McCown, R.L., Haaland, G. and de Haan, C.	1979	The interaction between cultivation and livestock production in semi-arid Africa	Account of the relationship between pastoralists and agriculturalists in Africa, with reference to the use of working animals
McKnight, T.L.	1958	The feral burro in the United States: distribution and problems	A study of the habits and activity patterns of feral donkeys in the USA, with observation of interaction between feral donkeys and local stock-keepers
McLean, A.K., C R. Heleski, Yokoyama, C.T., Wang, W., Doumbia, A., and Dembele, B.	2010	Improving working donkey (*Equus asinus*) welfare in Mali, West Africa: measuring behavior, heart rate variability, associated with driving methods and pressure associated with harness and cart quality	Discussion of the increased use of donkeys over oxen in West Africa, including findings of experimental use of a 'donkey motivator' rather than a halter
McShane, C. and Tarr, J.A.	2006	The horse as technology – the city animal as cyborg	Detailed account of the urban horse industry in 19th-century AD USA
McShane, C. and Tarr, J.A.	2007	The Horse in the City: living machines in the nineteenth century	Detailed account of the urban horse industry in 19th-century AD USA
Madama, E.A., Naazie, A., Adogla-Bessa, T. and Adjorlolo, T.K.	2008	Use of donkeys and cattle as draught animals in the Northern and Upper East and Volta Regions of Ghana	Findings from a survey and data collation in Ghana on the use of donkeys and oxen

Makwanda, A. Shemdoe, M.S. and Msagusa, M.	2000	Experience in the promotion of animal-powered weeding in Tanga Region, Tanzania	Results of a major programme of promotion of draught animal use in the Tanga region of NE Tanzania, including information gained during the operation of training courses and demonstrations
Malville, N.J.	1999	Porters of the eastern hills of Nepal: body size and load weight	Findings from a study of the activities of 635 porters transporting goods along three traditional trade routes of eastern Nepal, with an analysis of the reasons for their large load-carrying capabilities
Malville, N.J.	2001	Long-distance transport of bulk goods in the pre-Hispanic American Southwest	An examination of the limits of efficient foot transport of utilitarian goods and food in the pre-Hispanic American Southwest, based on field studies of long-distance domestic and commercial porterage in the hills of modern-day eastern Nepal, including data from a study of the capabilities of 635 porters
Malville, N.J., Byrnes, W.C., Lim, H.A. and Basnyat, R.	2001	The commercial porters of eastern Nepal: health status, work capacity, and energy expenditure.	The results of a study of the physiology and load-carrying capabilities of 50 hill porters in eastern Nepal, using questionnaires and physical testing, with the aim of assessing whether full-time porters had greater capabilities than part-time casual porters engaged primarily in subsistence farming
Marshall, F.	2007	African pastoral perspectives on domestication of the donkey: a first synthesis	An ethnoarchaeological study including an account of the use of donkeys for pack by African pastoral societies
Marshall, F. and Weissbrod, L.	2009	The consequences of women's use of donkeys for pastoral flexibility: Maasai ethnoarchaeology	A paper including the results of ethnoarchaeologial research in 2006 on donkey use and management among Maasai households in the Kajiado District of southern Kenya, based on interviews with and observation of the relevant activities of 26 women in eight of the 10 households in six pastoral settlements and focusing on donkey use and daily management, herd composition, mortality, and breeding behaviour
Marshall, F. and Weissbrod, L.	2011	Domestication processes and morphological change: through the lens of the donkey and African pastoralism	A paper including the results of ethnoarchaeologial research in 2006 on donkey use and management among Maasai households in the Kajiado District of southern Kenya, based on interviews with and observation of the relevant activities of 26 women in eight of the 10 households in six pastoral settlements and focusing on donkey use and daily management, herd composition, mortality, and breeding behaviour

Marshall, K. and Ali, Z.	2004	Gender issues in donkey use in rural Ethiopia	Findings from focus group discussions with 180 farmers in west, central and northern Ethiopia on the social, economic and cultural factors which influence the use of donkeys in farming systems, with particular emphasis on how utilisation, management and attitudes differ between men and women
Marshall, K. and Starkey, P.	1998	Donkeys and development: socio-economic issues: points from keynote presentation of K Marshall and P Starkey, drawing on the lead paper of P Fernando, G Bwalya, S Croxton, K Marshall, M Moorosi, M Mrema and P Starkey	Discussion of evidence of and reasons for the underutilisation of donkeys in Ethiopia and Africa generally, and their potential for use by women
Martinho de Almeida, A. and Alfaro Cardoso, L.	2008	Use of donkeys in the São Domingos and Bigene Sectors (Cacheu Region, NW Guinea-Bissau)	Account of barriers to greater adoption of donkey power in Guinea Bissau, in contrast with neighbouring Senegal
Matthewman, R.W.	1987	Role and potential of draught cows in tropical farming systems: a review	Account of the use of female cattle and buffalo for work, globally and in particular in Asia and Egypt
Matthewman, R.W., Dijkman, J.T. and Zerbini, E.	1993	The management and husbandry of male and female draught animals: research achievements and needs	Account of the use and management of draught oxen and cows in Africa, and of opportunities for increased use of cows
Meerpohl, M.	2007	Mobile oases in the Libyan desert	Description of mobile camel-markets used by nomads and semi-nomads in modern northern Africa
Meerpohl, M.	2013	Footprints in the sand: recent long-distance camel trade in the Libyan desert (northeast Chad/ southeast Libya)	Account of the daily life of modern long-distance camel caravans across the Sahara
Michaud, R. and Michaud, S.	[1977] 1978	Caravans to Tartary	An illustrated account of a long-distance journey with Kirghiz cameleers in Afghanistan

Mitchell, P.	2017	Why the donkey did not go south: disease as a constraint on the spread of *Equus asinus* into Southern Africa	A discussion of possible reasons for the slow spread of donkeys into southern Africa, suggesting the barrier of tsetse-fly carried disease
Mofya, R.	2004	Social consequences of introducing donkeys into Zambia	An analysis of the social impact of the introduction of donkey traction into Zambian small scale farming communities, which previously only used cattle for draught
Mofya, R. and Chisenga, N.	2000	Gender and animal draught power: experiences of Palabana with small-scale farmers in Zambia	An examination of gender approaches in the use of animal draught power in Zambia and the role that 'invisible' female farmers play in agricultural production
Mohammed, A.	1991	Management and breeding aspects of donkeys around Awassa, Ethiopia	Description of the use and management of donkeys in Ethiopia
Molnárová, K.	2008	Hedgerow-defined medieval field patterns in the Czech Republic and their conservation – a literature review	Note on S-shaped fields in the Czech Republic for best efficiency of movement of ploughing animals
Mongomongo, K. and Gembe, N.	2000	The promotion of animal traction and weeding technologies in Mbozi, Tanzania	Description of an initiative in 96 villages in the Mbozi district of Tanzania involving research into local farming systems and conversion of farmers in 11 villages to use of draught oxen
Moreno-García, M. and Pimenta, C.M.	2011	Animal dung: rich ethnographic records, poor archaeozoological evidence	Account of the central place of dung in modern rural societies, using an example in northern Morocco
Mpande, R.	1994	Donkey power for appropriate mechanisation and transport for women in Zambezi Valley, Zimbabwe	Study of the potential for donkey use for ploughing and transport in a region of Zimbabwe, with reference to the value for women

Mudamburi, B., Chigariro, J., Namalambo, E.S. and Chitsiko, R.J.	2003	Donkey population and management for utility in relationship to environmental degradation and traffic accidents in north central Namibia	Results of a major survey among 10,202 farming households in four regions of North Central Namibia. The main aim was to address perceived problems of donkeys causing road traffic accidents and environmental degradation due to over-grazing. The survey aimed to establish the donkey population and the areas of over-supply and demand for donkeys, as well as farmers' perception of donkeys; a structured questionnaire was used, and the findings reinforced by questioning local headmen and other stake-holders
Mukuka, I.	1994	A note on the use of animal traction by women in North-Western Province, Zambia	Comments on the use of animal traction by women in a region of Zambia
Mulanda, J., Mwenya, E. and Namalambo, E.	2000	Draught animal power: experiences of farmer training in the northern communal areas of Namibia	A review of the training of draught cattle and donkeys in northern Namibia
Muma, A.K.	1995	Involvement of women in animal traction in Kaoma District, Zambia	Findings of a socioeconomic survey among farmers of the barriers to cattle-ploughing, particularly among women, in a province of Zambia
Münzinger, P.	1982	Development and situation of animal traction in Africa and conditions limiting further promotion	Discussion of regional differences in extent of adoption of draught animals in Africa, and of factors involved
Mutali, A.	1999	Challenges and constraints of animal traction in Luapula Province, Zambia	Description of barriers to greater adoption of draught oxen in a province of Zambia
Mutemi, M.	2008	Trading in donkeys	Account by a Kenyan donkey merchant of the use and potential of donkey power in Kenya
Mutua, J.	2004	Some challenges to the use of donkeys in Kenya	An overview of the cultural, educationnal and practical constraints to the use of donkeys for draught in Kenya

Mutua, J. and Mwangi, J.N.	2000	Animal powered transport of goods in a diverse temporal and spatial environment: a case study of Lari, Central Kenya	The results of a survey in the Lari division of Kenya aimed at determining the role of donkeys in the area's economy and in the welfare of the community. Interviews and observations were conducted at market and trading centres, milk outlets, slaughter-houses, domestic water collection points and major outlets to the forests, plus the division's road network. Data was collected on the history of donkey transport and its role in the area's commerce, gender issues, care, problems encountered, possible solutions and unexploited potential
Muvirimi, F. and Ellis-Jones, J.	1999	A farming systems approach to improving draft animal power in sub-Saharan Africa	Comparison of factors in the use of donkeys and oxen for ploughing in Zimbabwe
Mwanzia, R.M.	2000	Possible use of wild animals in provision of draught power in the 21st century	Account of unmet need for animal power in Kenya despite widespread availability of oxen and donkeys; discussion of the potential for using buffalo, eland and zebra
Mwenya, E. and Chisembele, C.	2004	Donkeys in Zambia: experiences with their importation and quarantine	A discussion of the potential for increasing the availability of donkeys for transport in Zambia through importation from Zimbabwe and Botswana or through home breeding
Mwenya, E. and Keib, G.	2004	History and utilisation of donkeys in Namibia	An account of the historical and present use of donkeys in Namibia, including a survey among farmers in the Erongo region
Mwenya, E., Mwenya, W.N.M. and Dibbits, H.J.	1994	Animal draft power in Zambia: constraints to development and possibilities for improvements	Account of animal draught power in Zambia and its potential and problems
Ndayambaje, J.C.	2008	Animal welfare concerns and actions in Rwanda	Discussion of porterage, pack and draught transport in Rwanda
Ndiamé, F.	1988	Animal traction in Lower Casamance: technical aspects and socio-economic implications	An account of the current and unexploited potential role of cattle and donkey traction in the Lower Casamance region of Senegal, based on studies of farmer strategies and the socioeonomic impact of animal traction
Nengomasha, E.M., Pearson, R.A. and Gebre Wold, A.	2000	Empowering people through donkey power into the next millennium	Discussion of donkey use in Africa and the potential for increased use in replacing cattle for work

Ngamau, T.B.	1999	Socio-economic and gender issues in draft animal technology: a lady farmer's commentary	Findings and observations from a survey among Kenyan farmers of the potential for draught animal power, particularly for assisting women's work
Ngendello, A.M. and Heemskerk, W.C.S.	2004	Pack donkeys, bicycles and carts: a case-study from Sukumaland in north-west Tanzania	Results of a study in the Mwanza region of northwestern Tanzania, employing on-farm surveys and observation, concerning constraints on and potential for the increased use of donkeys for rural transport
Nicolaisen, J.	1963	Ecology and Culture of the Pastoral Tuareg	Description of the use of donkeys and camels for riding and pack by the Tuareg in north Africa
Nielsen, A.E.	2001	Ethnoarchaeological perspectives on caravan trade in the South-Central Andes	A detailed report on a survey of llama-caravans operating from a region of Bolivia, including participation by the author in a 20-day caravan journey from the Altiplano. Fieldwork, conducted at intervals during 1991-5, also included interviews with a number of caravaneers and a survey of several trails
Ochieng, F.	2011	KENDAT/ Brooke experiences	Account of increased use recently of donkeys for transport in Kenya
Ochsenschlager, E.L.	1992	Ethnographic evidence for wood, boats, bitumen, and reeds in southern Iraq	Account of an ethnographic study of the southern Iraq marsh Arabs
Ogola, E., Omemo, P., Opere, G., Okoko, J., Adhiambo, J., Owuor, S. and Oloo, V.	2014	Challenges to donkey welfare associated with perennial floods in Kano Plains, Western Kenya	Summary of a survey held through 8 focus groups (18-30 participants in each) in western Kenya, including donkey owners, users and handlers as well as local government and private animal health providers
OMAFRA staff	1997	Guidelines for using donkeys as guard animals with sheep	Account of the growing use of guard donkeys for sheep in Ontario and elsewhere, against the threat of coyotes and wolves

O'Neill, D.H.	1998	Technology for donkey utilisation: points from keynote presentation of D.H. O'Neill based on the paper prepared by D.H. O'Neill, A.A. Wanders and E. Mbanje	Examples of donkey traction use in Africa and a discussion of donkey power and strength
Orev, Y.	1972	Animal draught in West Africa	Discussion of the problems of increasing the use of animal draught in Africa
Ostrom, E., Burger, J., Field, C.B., Norgaard, R.B. and Policansky, D.	1999	Revisiting the commons: local lessons, global challenges	Account of the impact on ecosystems of state versus local management, with examples in China, Mongolia and southern Siberia
Otchere, E.O., Ahmed, H.U., Olorunju, S.A.S. and Kallah, M.S.	1988	Utilization and management for work oxen in a Guinea-savannah environment in Nigeria; initial survey results	Results of a survey among 300 farming households in Nigeria using animal traction, on the use and management of working cattle
Owiti, O.J. and Abdalla, R.	2010	Contribution of donkeys towards the Lamu economy and the challenges they face influenced either locally or globally	Description of the widespread use of donkeys in Lamu island, part of Kenya
Palmer, C.	1998	Following the plough	Account of disappearing traditional farming practices in north Jordan, and the former use of oxen
Palmer, C.	2015	(pers. comm.)	Notes on the use of donkeys in Jordan
Palmer, C., Smith, H. and Daly, P.	2007	Ethnoarchaeology	Findings from a survey by archaeologists of traces left by and spatial use of modern Bedouin occupants of Wadi Faynan in Jordan – relating in particular to animal management – to assist in addressing the archaeological problem of mobile pastoralist invisibility
Panin, A.	1987	The use of bullock traction technology for crop cultivation in northern Ghana: an empirical economic analysis	Findings from a socioeconomic study of bullock traction in northern Ghana, compared with hoe agriculture

Panin, A.	1988	Hoe and bullock farming systems in northern Ghana – a comparative socio-economic analysis	Findings from a socioeconomic study among households of bullock traction in northern Ghana, compared with hoe agriculture
Panin, A. and Ellis-Jones, J.	1994	Increasing the profitability of draft animal power	History and extent of animal traction in sub-Saharan Africa, with details of work rates, daily output and costs, including the advantages of using cows
Pankhurst, R.	1968	Economic History of Ethiopia, 1800-1935	Account of Ethiopian economy and trade in the 19th century AD, including the salt caravans
Patrick, C., Segwagwe, B.V.E. and Aganga, A.A.	2000	A review of donkey use in Botswana over a ten-year period	A review of data on the use of donkeys in Botswana between 1980 and 1990
Pearson, R.A.	1998	Improving the management of donkeys in Africa. Points from the keynote presentation by R.A. Pearson based on the paper prepared by R.A. Pearson, E.M. Nengomasha and R.C. Krecek	Notes on donkey usage in Africa
Pearson, R.A. and Smith, A.J.	1994	Improving draft animal management	Overview of best economic practices in draught animal management, with worldwide examples, including the potential for using cows
Pearson, R.A. and Vall, E.	1998	Performance and management of draft animals in agriculture in sub-Saharan Africa: a review	A technical review of the capabilities of different working animals and the implications for the effective use of animal power in agriculture in sub-Saharan Africa

Pearson, R.A., Alemayehu, M., Tesfaye, A., Allan, E.F., Smith, D.G. and Asfaw, M.	2001	Use and management of donkeys in peri-urban areas of Ethiopia. Report of Phase One of the CTVM/ EARO Collaborative Project, April 1999-June 2000	A major survey in central Ethiopia on donkey use, comprising interviews with 2,487 individuals, including rural and urban/ peri-urban owners of donkeys and non-owners, attenders of markets, and donkey traders. Key themes included constraints for women on access to donkeys, the importance of donkeys for short-distance transport including income-generating activities, rural and urban/ peri-urban variations, the social importance of lending donkeys, and the process of buying and selling donkeys
Peters, P.E.	1986	Household management in Botswana: cattle, crops, and wage labor	Description and discussion of the use of draught power in Botswana
Phillipson, D.W.	1993	The antiquity of cultivation and herding in Ethiopia	Description of the agricultural history of Ethiopia up to the present day
Phiri, G.B.M.	1994	Improving management of draft animals in Zambia	Account of the history and use of draught animals in Zambia
Pingali, P., Bigot, Y. and Binswanger, H.	1987	Agricultural Mechanization and the Evolution of Farming Systems in sub-Saharan Africa	Detailed analysis of the factors in differential uptake of animal traction in different agroclimatic and cultural regions of Africa
Prasad, V.L., Marovanidze, K. and Nyathi, P.	1991	The use of donkeys as draught animals relative to bovines in the communal farming sector or Zimbabwe	Findings from acomparative study in Zimbabwe of the performance and acceptance of draught donkeys, oxen and cows
Pratt, D.	2011	Contribution to livelihoods	Account of a survey in Kenya on the value of donkeys for transport
Pritchard, J.	2014	What role do working equids play in human livelihoods – and how well is this currently recognised?	Overview of the use and value of working equids, including a report on the use of equids in Guatemala. Includes reference to other regions, including the 2008/9 survey reported on by Waithanji 2009 and 2014
Ramachandran, S. and Srinivas, R.P.	1991	The contribution of the donkey and pony to the economy of rural low-income groups in Kamataka State, South India	Discussion of the management of donkeys in India

Raziq, A.	2011	Mangrota Camel Fair: a major socio-economic and cultural event in Pakistan	Description of the camel-fairs in Pakistan and the management of camels
Raziq, A. Yahya, M.K., Rehman, Z. and Jabbar, A.	2010	Donkey breeds of North-Eastern Balochistan, Pakhtoonkhua, and Southern Afghanistan	Description of the use and types of donkey in Baluchistan and surrounding areas
Reed, K.	2011	Economic value of working animals	Notes on the use and value of equines for transport in Guatemala and Africa, including the results of surveys among households in Ethiopia, Mali and the Gambia
Riemer, H. and Förster, F.	2013	Ancient desert roads: towards establishing a new field of archaeological research	Comments on the severe lack of ethnographic work done on roads in NE Africa and elsewhere, and their general confinement to accounts of geographic information from caravan leaders or guides
Robertshaw, P.T.	1978	The archaeology of an abandoned pastoralist camp-site	Consideration of a recently-abandoned pastoralist camp in South Africa as an indicator of likely archaeological evidence of ancient campsites
Robinson, R.	1977	Ways to Move: the geography of networks and accessibility	Account of a study of transport in Africa, inclucing results of a census in 1964 on roads running north in and out of Kano in Nigeria, which indicated the variations in use between human porterage and donkeys
Ruthenberg, H.	1964	Agricultural Development in Tanganyika	Account of the introduction and development of ox-ploughing in Tanzania
Ruthenberg, H.	1983	Farming Systems in the Tropics	A description of different animal husbandry approaches in Africa by nomads and farmers according to rainfall levels
Schmitz, H., Sommer, M. and Walter, S.	1991	Animal Traction in Rainfed Agriculture in Africa and South America.	Account of the use of animal traction in Africa and South America
Schneider, H. K.	1979	Livestock and Equality in East Africa: the economic basis for social structure	Description of the management of cattle in East Africa

Shackelford, L., Marshall, F. and Peters, J.	2013	Identifying donkey domestication through changes in cross-sectional geometry of long bones	Discussion of domestication of donkeys, with material on domesticated donkey use in modern Africa
Shah, N.	2002	Status and action plan for the kiang (*Equus kiang*)	Summary of the status of the kiang hemione
Shenk, M., Borgerhoff Mulder, M., Beise, J., Clark, G., Irons, W., Leonetti, D., Low, B.S., Bowles, S., Hertz, T., Bell, A. and Piraino, P.	2010	Intergenerational wealth transmission among agriculturalists: foundations of agrarian inequality	Part of a series of analyses of a range of recent and modern societies practicing foraging, pastoralism, horticulture and agriculture, with the aim of studying the circumstances of wealth inequality; this paper examines agricultural societies
Siacinji-Musiwa, J.M.	1999	Conservation tillage in Zambia: Some technologies, Indigenous methods and environmental issues	An overview of statistical material and surveys among farmers in Zambia on the issues relating to the envisaged promotion of conservation tilling with oxen
Sieber, N.	2004	The economic impact of pack donkeys in Makete, Tanzania	The survey on which this paper is based followed on from a project aimed at improving the transport capacity of rural households in Makete region in Tanzania, including a plan for provision of donkeys. The survey, which examined the socio-economic changes resulting from the project, was conducted among 248 households in eight villages in the region
Simoons, F.J.	1960	Northwest Ethiopia: peoples and economy	Detailed description of the use of working animals in NW Ethiopia, based on an 8-month survey by the author in 1953-4
Sims, B.G. and Maldonado, S.J.	1991	Donkeys and other equines in Mexican agriculture	Discussion of costs of using donkeys in Mexico
Sims, B.G. and O'Neill, D.H.	2003	Aspects of work animal use in semi-arid farming systems	Discussion of the use of animal power in farming in semi-arid regions

Sims, B.G., Zambrana, L. and Dijkman, J.	2002	Improved management and use of draft animals in the Andean hill farming systems of Bolivia	Summary of the use of draught animals in Bolivia
Singh, M.K., Gupta, A.K. and Yadav, M.P.	2007	Performance evaluation of donkeys in arid zone of India.	Findings from a survey ot the use and cost-benefits of donkeys in modern India
Singh, R.D.	1988	Economics of the Family and Farming Systems in sub-Saharan Africa	Findings from a large-scale qualitative survey on the use and advantages of draught animals among farming families in 7 villages in central Burkina Faso, conducted through observation and detailed discussions on frequent visits over the course of a year
Smith, D. and Pearson, R.A.	2005	A review of the factors affecting the survival of donkeys in semi-arid regions of Sub-saharan Africa	An assessment of the relative utility of donkeys and cattle, in terms of survival capabilities, in semi-arid regions of sub-Saharan Africa, and the resulting preferential adoption of donkeys by small-holders; data from Zimbabwe and Ethiopia is discussed
Sosovele, H.	1994	Transfer of animal traction technology: cultural and social issues in Tarime District, Tanzania	History of animal traction in Tanzania and the cultural and social issues arising, particularly with regard to the work of women
Sosovele, H.	2004	Donkey traction in Tanzania: some critical issues	An overview of the position and underuse of donkey traction in Tanzania
Spencer, D.S.C	1988	Farming systems in West Africa from animal traction perspectives	An overview of the potential for animal power in West Africa
Spencer, D.S.C. and Byerlee, X.	1976	Technical change, labour use, and small farmer development: evidence from Sierra Leone	Discussion of findings from a nationwide farm management survey in Sierra Leone in which interviews were conducted with 500 rural households in 24 locations, examining the impact of animal traction technology and other changes, and the effect on labour use
Spiess, H.U.	1994	Report on draught animals under drought conditions in Central, Eastern and Southern zones of Region 1 (Tigray)	Findings of a field visit to the Tigray region of Ethiopia to establish the issues of draught animal use in drought conditions

Starkey, P.	1981a	Farming with Work Oxen in Sierra Leone	A detailed examination, based on studies and field trials, of the potential for and value of ox-ploughing in place of mechanisation for small farmers in Sierra Leone
Starkey, P.	1981b	N'Dama cattle as draught animals	Results of a study of the use and advantages of N'Dama (taurine) cattle for draught in Sierra Leone
Starkey, P.	1986	Animal power in Africa: perspectives, preconditions, priorities	Description of use of draught cattle for ploughing in Ethiopia
Starkey, P.	1987	Brief donkey work	Account of the variations in adoption of draught animal power in different African countries and regions, and of the increasing switch from cattle to donkeys in some regions
Starkey, P.	1988	The introduction, intensification and diversification of the use of animal power in West African farming systems: implications at farm level	Account of the social and practical implications of the introduction of draught animals in West Africa, and the preference in some regions for donkeys over cattle
Starkey, P.	1989	Harnessing and Implements for Animal Traction: an animal traction resource book for Africa	Discussion of the importance of harness in the output of draught animals in Africa
Starkey, P.	1991	Animal traction: constraints and impact among African households	Account of the history of draught animal use in 20th-century AD Africa, and the obstacles to adoption in some regions
Starkey, P.	1992	Alive and pulling	Account of practices and change in management and use of draught animals in Asia and Africa
Starkey, P.	1993	Animal Traction: a worldwide view with a small farmer perspective	Account of practices and change in management and use of draught animals in Asia and Africa
Starkey, P.	1994a	A world-wide view of animal traction highlighting some key issues in eastern and southern Africa	A world history of the use and development of animal traction, with regional differences and with particular focus on issues with animals traction in eastern and southern Africa

Starkey, P.	1994b	Donkey utilisation in sub-Saharan Africa: recent changes and apparent needs	Findings from a series of field visits over ten years to more than 20 countries in West, East and southern Africa, examining the role and utilisation of donkeys. Barriers to use such as climate, official reluctance and local prejudice are discussed, as well as local initiatives and the value of donkeys for women
Starkey. P.	1994c	The transfer of animal traction technology: some lessons from Sierra Leone	History of the advent of animal traction in Sierra Leone and the many constraints encountered, with comments on good practice in introduction of animal traction technology
Starkey, P.	1995	The donkey in South Africa: myths and misconceptions	Discussion of donkey habits and propensities and the implications for their use in work, using examples from Africa and Latin America
Starkey, P.	1998d	Donkeys and people: a world-wide review	Report on a five-day international workshop on donkey power held in Ethiopia, aimed at increasing donkey utilisation and improving donkey management
Starkey, P.	1998c	Field visits	Report on observation visits to three regions of Ethiopia conducted during a five-day international workshop on donkey power held in Ethiopia, aimed at increasing donkey utilisation and improving donkey management
Starkey, P.	2000a	The history of working animals in Africa	Account of historical and modern use of donkeys in Africa, including discussion of regional variations in adoption
Starkey, P.	2000b	Empowering farmers with animal traction: worldwide trends, issues and challenges	Discussion of animal traction including details of usage of oxen and cows in South Africa
Starkey, P.	2011	Livestock for traction and transport: world trends, key issues and policy implications	Detailed global overview of working animals today, summarising population, use and benefits overall and by world region
Starkey, P. and Apetofia, K.V.	1986	Integrated Livestock Systems in Nepal and Indonesia: implications for animal traction programs in West Africa	Discussion of the use and management of draught animals in Nepal and Indonesia, with reference to opportunities and obstacles in West Africa

Starkey, P. and Fernando, P.	1998	Women, transport energy and donkeys: some implication for development workers	An assessment, based on surveys in various countries, of the potential role of donkey energy in easing the work burden of women in Africa
Starkey, P. and Mutagubya, W.	1992	Animal traction in Tanzania: experience, trends and priorities	Account of studies of the use of oxen and donkeys in Tanzania, for transport and agriculture, with comments on variations in other African countries
Starkey, P., Hanekom, D., Lake, T., Meikle, G. and Jaiyesimi-Njobe, F.	2000	Animal traction in South Africa: the present situation	Findings from extensive field surveys in nine regions of South Africa, involving a major programme of open-ended interviews and discussions with farmers and relevant officials, to establish the present situation and potential of the use of animal traction
Starkey, P.,Jaiyesimi-Njobe, F. and Hanekom, D.	2000	Animal traction in South Africa: overview of the key issues	An overview of the situation and renewed potential for animal traction in South Africa, based on information from field observations, discussions with farming families, literature analysis and input from students and professionals involved in education, research and agricultural development
Steel, J.A.C.	2000	The introduction of animal-powered weeding technology in Morogoro Region, Tanzania	A review and evaluation of the introduction of draught animal power in the Morogoro Region of Tanzania, including the results of 132 interviews with village leaders, village extension workers and farmers who had or had not used oxen
Steensberg, A.	1971	Drill-sowing and threshing in southern India	Account of drill-sowing and threshing in modern and ancient India
Stevens, P.A.	1994	Improving animal-powered tillage systems and weeding technology	Detailed description of the practice of conservation tillage and its advantages and drawbacks for African agriculture, with particular reference to weeding
Suleiman, A.	2013	(pers. comm.)	Pers. comm. by Nigerian post-graduate veterinary student on ploughing and use of working animals in Nigeria
Sundkvist, A.	2004	Herding horses: a model of prehistoric horsemanship in Scandinavia – and elsewhere?	Free-roaming horse-keeping systems, in antiquity and in modern Mongolia, Argentina, France and early colonial America

Swai, E.S. and Bwanga, S.J.R.	2008	Donkey keeping in northern Tanzania: socio-economic roles and reported husbandry and health constraints	A survey among 145 families in three agro-pastoral sites in Northern Tanzania, on the socio-economic roles, husbandry and management of donkeys
Sweet, L.	1971	The Arabian peninsula	Account of the organisation of long-distance camel caravans in the Arabian peninsula in the 20th century AD
Sylwander, L.	1994	Women and animal traction technology	Examination of the constraints for women in adopting animal traction for agriculture in southern and eastern Africa
Tabbaa, D.	2003	Use of equines and their management in Syria: historical and modern	Description of use and management of donkeys and mules in history and the present day in Syria
Tarr, J.A.	1999	A note on the horse as an urban power source	An assessment of the use of horses in 19th-century AD American cities for stationary power, and of their value in allowing smaller enterprises in particular to participate in the increase in urban manufacturing and to contribute to urbanisation
Temesgen, M.	2000	Animal-drawn implements for improved cultivation in Ethiopia: participatory development and testing	Results of studies among farmers in Ethiopia as part of the process of developing improved implements for ox-ploughing
Theodossopoulos, D.	2005	Care, order and usefulness: the context of the human-animal relationship in a Greek island community	Account of animal management by farmers on a modern Greek island
Thompson, F.M.L.	1983	Horses and hay in Britain 1830-1918	Account of the foddering industry in 19th- early 20th-century AD Britain

Tibbs, P.	1989	The Importance of Working Animals to the Livestock and Arable Sectors of Modern Agriculture in the People's Republic of China: the report of a fellowship study in the People's Republic of China, Autumn 1987	Findings of a study of the role of working animals in modern agriculture in China, with references to Africa
Tiffen, M.	1976	The Enterprising Peasant: economic development in Gombe Emirate, North Eastern State, Nigeria, 1900-1968	Account of factors limiting uptake of ploughing with oxen in a region of Nigeria the mid 20th century AD
Twerda, M., Fielding, D. and Field, C.	1997	Role and management of donkeys in Samburu and Turkana pastoralist societies in northern Kenya	Findings of a survey in northern Kenya among 67 women owning or managing a total of 583 donkeys in Samburu and Turkana pastoralist societies, on the role and management of donkeys
Upadhyay, R.C.	1991	Equine power – the role and future potential in India	Comparison of donkey and other draught animal capabilities from field studies in India
Urga, B. and Abayneh, T.	2007	Study on management practices and work-associated health problems of draught oxen around Debreberhan, Central Ethiopia	Findings from a survey conducted in North Shewa region in central Ethiopia among 402 households owning a total of 543 draught oxen, to assess the management practices and work-associated health problems of draught oxen
Uzureau, C.	1974	Animal draught in West Africa	Account of cultural and practical influences on adoption of draught donkeys and cattle in Africa
Valette, D.	2014	Invisible Helpers: women's views on the contributions of working donkeys, horses, and mules to their lives. Key findings from research in Ethiopia, Kenya, India and Pakistan	Findings of a survey among women in India, Pakistan, Kenya and Ethiopia, on their relationship with working equids. 22 focus groups in total, up to 12 women in each. Equids very important to all the women, for income generation and help with daily household tasks

Valette, D. and Upjohn, M.	2014	Voices from women: working equids as 'invisible helpers'	Findings of a survey among women in India, Pakistan, Kenya and Ethiopia, on their relationship with working equids. 22 focus groups in total, up to 12 women in each. Equids very important to all the women, for income generation and help with daily household tasks
Vall, E. and Lhoste, P.	2003	Animal power in the West and Central Francophone zone of Africa in a renewed context: the issues for development and research achievements	Overview of the use and impact of draught animals in sub-Saharan Africa, and factors in variation in adoption rates of donkeys and oxen
Vall, E., Dongmo Ngoutsop A.L., Abakar, O. and Meyer, C.	2002b	La traction animale dans le nouveau contexte des savanes cotonnières du Tchad, du Cameroun et de la République centrafricaine. I. Diffusion de la traction animale et sa place dans les exploitations	Overview of the use and impact of draught animals in sub-Saharan Africa, and factors in variation in adoption rates of donkeys and oxen
Vall, E., Dongmo Ngoutsop A.L., Abakar, O. and Meyer, C.	2002a	La traction animale dans le nouveau contexte des savanes cotonnières du Tchad, du Cameroun et de la République centrafricaine. II. Quelles priorités pour la recherche et le développement	Overview of the current use of draught animals in sub-Saharan Africa
Vall, E., Lhoste, P., Abakar, O., Dongmo Ngoutsop, A.L.	2003	La traction animale dans le contexte en mutation de l'Afrique subsaharienne: enjeux de développement et de recherche	Statistically-based overview of animal traction in sub-Saharan Africa
van Leeuwen, M. and Siyabango, N.	1999	Ox carts in Kaoma, Zambia	Findings from a survey of 83 ox-cart owners in the Kaoma district of Zambia, conducted as part of an investigation of the economic and technical aspects of ox-cart transport in the country

Viebig, U.	1982	Basic aspects of harnessing and the use of implements	Comparison of factors influencing differing traction capacity of donkeys and cattle in Africa
Waithanji, E.M.	2009	Findings of a Preliminary Anthropological Survey on donkey Welfare in Mwea, Lari, and Limuru, Kenya	Analysis of a survey in 2008/9 in 3 areas of Kenya, using desk research, observations, 7 focus group discussions (69 respondents), 20 face-to-face interviews with donkey owners/ users, and discussions with animal health providers and key informants
Waithanji, E.M.	2014	A brief on gender and working equids' welfare in Kenya	Report on the findings of a survey in Kenya (see Waithanji 2009)
Walton, M.T. and Feild, C.A.	1990	Use of donkeys to guard sheep and goats in Texas	From the proceedings of a conference on Wildlife Damage Control in Nebraska, USA, a discussion of feedback from ranchers on the use of guard donkeys for protection of sheep and goats
Wambui, C.C., Abdulrazak, S.A., Ondiek, J.O. and Ogore, P.B.	2004	Role and management of donkeys at farm level in Nakuru district, Kenya	Findings from a study among smallholder farmers in Kenya on the use and management of donkeys
Watts, M.	1999	Working Oxen	Account of training and use of draught oxen in recent British history
Wellard, K. and Mortimore, M	2000	Farmer-led adoption of ox weeding in Machakos District, Kenya	A research-based account of the development of animal power for weeding in the Machakos District of Kenya
Wells, D. and Krecek, R.C.	1997	Socio-economic role of donkeys in Hammanskraal, South Africa	Results of a survey in a South African village among donkey-owners, on use and management
Wells, D. and Krecek, R.C.	2001	Socio-economic, health and management aspects of working donkeys in Moretele 1, North West Province, South Africa	Results of a survey in a South African village among donkey-owners, on use and management
Wells, D., Krecek, R.C. and Kneale, J.A.	2004	Socio-economic and health aspects of donkeys in North-West and Eastern Cape Provinces, South Africa	Results of a programme of semi-structured interviews with 54 owners of donkeys or occasionally mules, in five villages in rural, semi-rural and urban areas of South Africa, concerning the socio-economic role of donkeys

Westneat, A.S., Klutse, A. and Amegbeto, K.N.	1988	Features of animal traction adoption in Togo	Discussion of the position and potential of animal traction in Togo, underlining factors in differential adoption by region
Whittaker, J.	1999	Alonia: the ethnoarchaeology of Cypriot threshing floors	Account of traditional animal-powered threshing practices in Cyprus
Whittaker, J.	2003	Threshing sledges and threshing floors in Cyprus	Account of traditional animal-powered threshing practices in Cyprus
Wilson, R.T.	1978	Studies on the livestock of southern Dafur, Sudan VI. Notes on equines	Account of the breeding and use of donkeys in Sudan
Wilson, R.T.	1981	Distribution and importance of the domestic donkey in circumSaharan Africa	A statistical summary of the distribution and density of working donkeys in circum-Saharan Africa by topographic and climatic region, and of their role in small-scale farming and possibilities as an economic force. Research material included a survey of 58 households in the Tigre region of Ethiopia and a large-scale programme of observation of the movements of transport animals into Niono town in Mali
Wilson, R.T.	1991	Equines in Ethiopia	Account of the use and management of equines in Ethiopia, including results of studies
Wilson, R.T	2000	The use and value of animal power in Zimbabwe	Comparisons between donkeys and cattle for work in Zimbabwe, including cows
Woldekiros, H.	2014	The Afar Caravan Route: insights into Aksumite (50 BCE-CE 900) trade and exchange from the low deserts to the north Ethiopian plateau	Abstract of an unpublished detailed study of the historical and modern Afar salt-caravans in north-eastern Ethiopia, based on archaeological investigation and on ethnographical work including accompanying present-day donkey and camel caravans on the route
Wood, A. and Milimo, J.	1994	Transfer of animal traction technology in Zambia: an historical perspective	History of the adoption of animal traction in Zambia
Yilmaz, O.	2011	The phenotypic characteristics of Turkish donkeys raised in East and Southeast of Turkey	Description of the use and management of donkeys in modern Turkey

Yilmaz, O.	2014	The use of mules in eastern Turkey	Account of the use of donkeys and mules for unaccompanied smuggling of goods across the eastern Turkish border to Iran and Iraq
Yusuf, V.A., Ibrahim, Y.A., Hamagam, A.M. and Onuchukwu, B.	2016	Chinese are going gaga for Nigerian donkeys	A report on the large-scale export of donkey hides and milk from Nigeria to China, for use for food, beauty preparations and medical products
Zaman, S. Kumar, A. and. Compston, P.	2014	Contribution of working equids to the livelihoods of their owners in Uttar Pradesh, India	Report on a survey in Uttar Pradesh in 2013 on the financial contribution of equids to households. Equid-owners, landless individuals and poor land-owning individuals in 8 villages. An important contribution was from seasonal work for the brick-kilns
Zaman, S.F., Upjohn, M. and Valette, D.	2014	Working equids and women: a new paradigm in animal welfare	Account of a survey among 7 equid-owning communities in Uttar Pradesh, with focus groups and key informant interviews with equid-owning women, 78 in total. The results underlined the income-earning benefit of donkeys for women, as well as increased status
Zenebe, S. and Fekade, T.	2004	The role of donkey pack-transport in the major grain market of Addis Ababa	Findings from a survey of the use of donkeys for pack transport of grain in Addis Ababa in Ethiopia, using unstructured questionnaires to interview donkey operators, grain traders, consumers, veterinarians, local Kebele offices, local development committees and traffic police, combined with observations at markets and in the town
Zerbini, E., Gebre Wold, A. and Shapiro, B.I.	1999	The potential of cow traction in the East African highlands	Results of a feasibility study on the potential for using cows for traction in Ethiopia

Appendix II: KEY-SUBJECT ANALYSES: TABULATION OF REFERENCES BY SUBJECT FROM ETHNOGRAPHIC, ARCHAEOLOGICAL AND OTHER SOURCES

These tabulations list all references to selected key subjects. They are referred to in the main text by Appendix no. (APP), e.g. APP II.1; the dual aim is to clear the main text of long strings of citations, and to provide an easily-usable resource of further reading on given subjects. 'APP II.x' in the main text indicates that citations for a given point are listed in the named Appendix II table. Figure 63 gives an example using a typical paragraph:

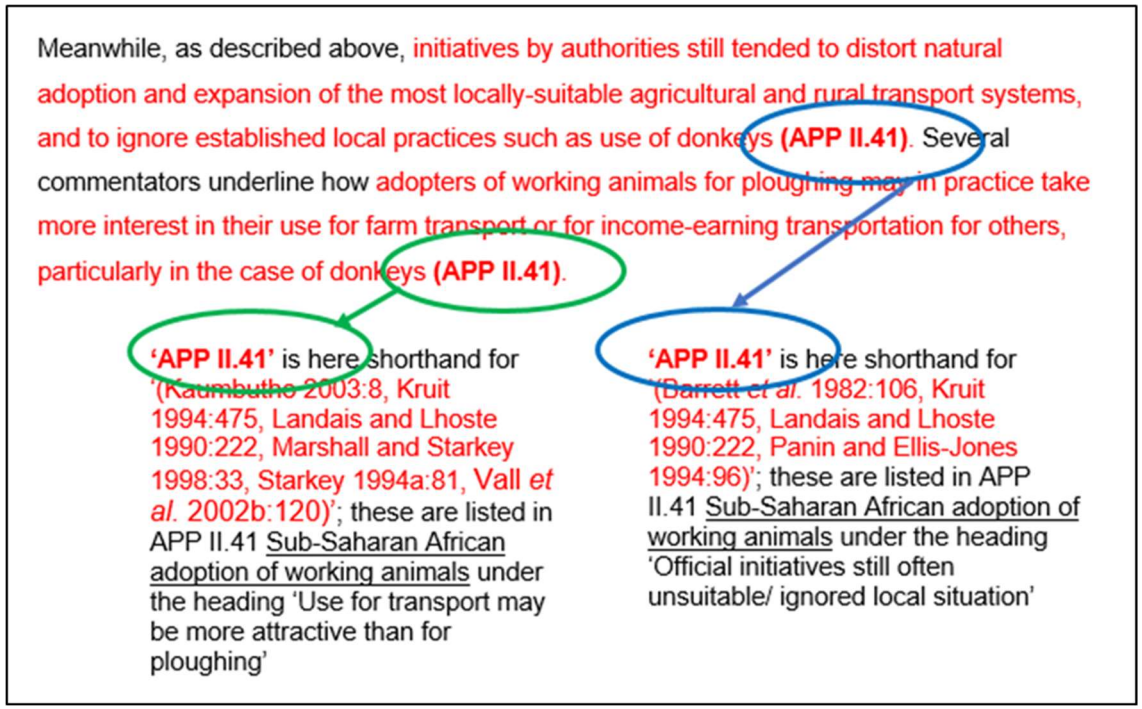

Figure 63: Illustration of the APP system

All cited sources are referenced in full in the bibliography. In the case of modern studies, the reader can also refer for more information to Appendix I.2 Content précis of the modern studies used, in which all ethnographic and other modern working-animal studies used in this thesis are listed with a brief paragraph on the approach and content of each.

II.1 Consequences of the adoption of animal ploughing

CONSEQUENCES OF THE ADOPTION OF ANIMAL PLOUGHING	Animal ploughing allows larger cultivated area (i)	… but often first taken up by larger farms, so cause not effect	(Ox-) ploughing may well not improve per-ha yield	Improves per-farm more than per-labour unit yield (ii)	Ox-ploughing creates fodder and grazing issues	Plough animal husbandry and maintenance tasks	Animal ploughing requires land clearance
Bangura 1988:297					* (v)		
Barrett *et al.* 1982	p6		p6/61		p37		
Blench *et al.* 2004:213					*		
Bogucki 1993:497		*					
Boserup [1965] 2005:35-41					* (iv)		
Bradbury 2010:7					*	*	
Brodie 2008:303					*	*	
Bwalya 2004:130	*						
Campbell 2005:88					*		
Carswell 1997:10							*
Dahl and Hjort 1976:241					*		
Delgado and McIntire 1992:188-94	*		*	*	* (p190:v)	*	
de Wilde 1967	p53		p53		p109		p103 (iii)

CONSEQUENCES OF THE ADOPTION OF ANIMAL PLOUGHING	Animal ploughing allows larger cultivated area (i)	… but often first taken up by larger farms, so cause not effect	(Ox-) ploughing may well not improve per-ha yield	Improves per-farm more than per-labour unit yield (ii)	Ox-ploughing creates fodder and grazing issues	Plough animal husbandry and maintenance tasks	Animal ploughing requires land clearance
Farnham 1997	p153	p25/153	p23/32/172	p163	p24	p25	
Floor 2003			p210		p543		
Gilman 1981:6							*
Goody 1976:25/108	*						
Gourou 1961:123	*		*	*			
Halstead 1987a:84					*		
Halstead 1995:11-12			*		*		*
Halstead 2014					p16/20		p17/20/48 (iii)
Halstead and Isaakidou 2011:62		*			* (iv)		*
Hassan and Ibitoye 1993:141					*		
Havard *et al.* 2007:29-30						*	*
Hesse and Runge-Metzger 1999:226-7	*		*	*	* (iv)	*	
Isaakidou 2008:105					* (iv)		
Isager and Skydsgaard 1992:105					*		
Jabbar 1993:263					*		
Jaeger and Matlon 1990	p46		p37/46	p188-94			
Jolly and Gadbois 1996	*		*	*	p455 (v)		
Jongman 1988:211					* (iv)		
Kjaerby 1983		p54/60		p24	p30		p26
Kruit 1994:477					*		

CONSEQUENCES OF THE ADOPTION OF ANIMAL PLOUGHING	Animal ploughing allows larger cultivated area (i)	… but often first taken up by larger farms, so cause not effect	(Ox-) ploughing may well not improve per-ha yield	Improves per-farm more than per-labour unit yield (ii)	Ox-ploughing creates fodder and grazing issues	Plough animal husbandry and maintenance tasks	Animal ploughing requires land clearance
Landais and Lhoste 1990			p224		p218-225/231	p224	
Langha 1999:239	*						
McCann 1984:4						*	
McCann 1995					p168		p58/222 (iii)
McCown *et al.* 1979:306					*		
Makwanda *et al.* 2000:174	*						
Muma 1995:45							*
Oates and Oates 1976:119-20					*		
Orev 1972:236					*		
Panin 1987:6							*
Panin 1988	p157		p28	p56		p28	
Panin and Ellis-Jones 1994:96	*		*				
Pearson and Smith 1994:123-4					*		
Pearson and Vall 1998:310	*		*				
Philip 2001:187						*	
Pingali *et al.* 1987	p112	p112/116	p107		p96	p108	p34/38/107
Potts 1997:82					*		
Prasad *et al.* 1991:234	*				*		
Reh 1982:97/108					*		
Renger 1990:273					*		

CONSEQUENCES OF THE ADOPTION OF ANIMAL PLOUGHING	Animal ploughing allows larger cultivated area (i)	… but often first taken up by larger farms, so cause not effect	(Ox-) ploughing may well not improve per-ha yield	Improves per-farm more than per-labour unit yield (ii)	Ox-ploughing creates fodder and grazing issues	Plough animal husbandry and maintenance tasks	Animal ploughing requires land clearance
Ruthenberg 1964					p34	p34	p184
Sieber 2004:119	*						
Simoons 1960:69-70							* (iii)
Singh 1988:166		*	*	*			
Spencer and Byerlee 1976:877				*			
Starkey 1981b:23					*		
Starkey 1989:36					*		
Starkey 1991:79-80					*		*
Starkey and Apetofia 1986:15					*		
Abubaker Suleiman 2013 (pers. comm. – Note 1)					* (iv)		
Temesgen 2000:73					*		
Thompson 1983:58					*		
Tibbs 1989	p2-3	p9	p2/9-10				
Urga and Abayneh 2007:5					*		
Vall *et al.* 2002b:124						*	
Westneat *et al.* 1988:334/337							*
Wilkinson 1972:31					*		
Zarins 2014:223					*		

Note 1: Nigerian PhD student at the Royal Veterinary College in London

(i) References to larger cultivated area:
Goody (1976:107-108), Halstead (1995:16) and Reed (2011:19) report that farms with animal ploughing are larger, without assigning causation
Halstead (1995:13/16) and Panin and Ellis-Jones (1994:96) argue that larger areas not only can but must be cultivated
Lhoste (2004:128) states that animal ploughing can increase per-hectare yield but notes that a range of factors may in practice militate against a larger area being cultivated

(ii) Barrett *et al.* 1982:61-6, Havard *et al.* (2007:28), Lhoste (2004:126) and McCann (1984:4) report some increased work productivity in Francophone sub-Saharan Africa

(iii) de Wilde (1967:103), Halstead (2014:20/48), McCann (1995:58) and Simoons (1960:69-70) report that in Ethiopia and elsewhere stumps and stones are often ploughed around instead; stones help to retain moisture and lessen erosion

(iv) Multi-use or specialist fodder crops may put pressure on the land available for human-use crops

(v) Farmers in arid regions such as central Burkina Faso and Nigeria traditionally entrust their cattle to nomadic herders for at least part of the year, but herders' annual round takes the cattle to a distant area at the critical working time; animals used for work therefore have to be managed intensively on-farm, with corresponding labour implications

II.2 Advantages of donkeys compared with oxen (I)

ADVANTAGES OF DONKEYS COMPARED WITH OXEN (I)	**Cheaper to buy/ oxen expensive (vii)**	**Ease of training**	**Quick to learn, gd memory, operate without super-vision**	**Ease of handling … *W/C: esp. by women/ children* (v)**	**More careful/ accurate/ straight line**	**Greater speed of walking (i)**	**More flexible in their working speeds**	**Not prone to theft … *XM: as not valued for meat (ii)***
Admassu and Shiferaw 2011:44				*				
Aganga and Tsopito 2004:158-9			*					
Aganga *et al.* (Aganga, Patrick &c) 2000:262								* XM
Anderson and Dennis 1994	p382							p381 XM
Andrianaivoarivony and Starkey 2003:9						*		*
Barrett *et al.* 1982:77/93	p77/93	p102						
Betker and Kutzbach 1991	p223	p223		p223			p224	
Blench *et al.* 2004:217								* XM
Bobobee 1999:61								*
Brodie 2008:303				* WC				* XM
Cochin 1995				p61-2 WC				p57 XM
de Wilde 1967:106		*						
Dennis 1996:143				*				
Dennis and Smith 1995:113		* (vi)						
Digard 1982:138		* (vi)						

ADVANTAGES OF DONKEYS COMPARED WITH OXEN (l)	**Cheaper to buy/ oxen expensive (vii)**	**Ease of training**	**Quick to learn, gd memory, operate without super-vision**	**Ease of handling … *W/C: esp. by women/ children* (v)**	**More careful/ accurate/ straight line**	**Greater speed of walking (i)**	**More flexible in their working speeds**	**Not prone to theft … *XM: as not valued for meat (ii)***
Dijkman 1992:155						*		
Doran 1994:273	*							
Fernando and Starkey 2004:13	*							*
Fielding 1988:2		* (vi)						
Fielding and Krause 1998:13	*		*			*	*	
Förster *et al.* 2013:195		*	*					
Hagmann and Prasad 1995		p235		p235	p231/235			
Haufiku *et al.* 2004				p178 W				
Havard *et al.* 2007:30	*							
Himeur 2003			* (iii)					
Inns 1980:6	*	*	*	*			*	
Jones 2000a:190					*			
Jones 2000b:237			*					
Jones 2008a:13							*	
Jones 2008b:49			*					
Jones 2008c:18		* (vi)						
Jones [P.A.] 2009:3			* (iii)					
Jones 2011				*				
Joubert and Kotsokoane 2000:12	*			* WC				
Kaumbutho 2003:11	*							

ADVANTAGES OF DONKEYS COMPARED WITH OXEN (I)	**Cheaper to buy/ oxen expensive (vii)**	**Ease of training**	**Quick to learn, gd memory, operate without super-vision**	**Ease of handling … *W/C: esp. by women/ children* (v)**	**More careful/ accurate/ straight line**	**Greater speed of walking (i)**	**More flexible in their working speeds**	**Not prone to theft … *XM: as not valued for meat (ii)***
Kaumbutho *et al.* 2004:98				*				
Kerman 1985:17				*	*			
Kjaerby 1983:159		*	*					
Kruit 1994:477	*							
Kumwenda and Mayeyo 1991				p30 WC				p29 XM
Landais and Lhoste 1990:222				*		*		* XM
Littauer and Crouwel 1979:23						*		
Lubwama 2000:125-6				* W				
McCann 1984:4	*			*				
Makwanda *et al.* 2000:175				*	*			
Marshall 2007:374		*				*		
Marshall and Ali 2004:65				* W				
Marshall and Weissbrod 2009:70			*					
Mitchell 2017:35						*		
Mofya 2004:141								* XM
Mpande 1994:152	*	*	*	*	*			
Muvirimi and Ellis-Jones 1999:6	*							
Nengomasha *et al.* 2000		p23		p22 WC				
Ogola *et al.* 2014:43					*			

ADVANTAGES OF DONKEYS COMPARED WITH OXEN (I)	**Cheaper to buy/ oxen expensive (vii)**	**Ease of training**	**Quick to learn, gd memory, operate without super-vision**	**Ease of handling … *W/C: esp. by women/ children* (v)**	**More careful/ accurate/ straight line**	**Greater speed of walking (i)**	**More flexible in their working speeds**	**Not prone to theft … *XM: as not valued for meat (ii)***
Palmer 1998:142							*	
Patrick *et al.* 2000:258				*	*			
Pearson and Vall 1998						p312	p309-12	
Pearson *et al.* 2001	p31	p31		22/31-2				
Prasad *et al.* 1991:236		*		*				
Reh 1982:132	*	*		*		*	*	* XM
Siacinji-Musiwa 1999:30					*			
Simoons 1960:145	*							
Smith and Pearson 2005:1								* XM
Sosovele 2004			p109 (iii)	p107 W	p109			p109 XM
Starkey 1987	p39		p40	p40				p40 XM
Starkey 1988	p107	p108	p107	p107				p107 XM
Starkey 1991								p81 XM
Starkey 1992:21	*			* C				* XM
Starkey 1994a	p74			p74			p68	
Starkey 1994b:3	*			* C				* XM
Starkey 1995:148			*					
Starkey 1998d:22				* C				
Starkey 2000a	p490			p498 W		p490		
Starkey 2011								p12/17/25
Starkey *et al.* (Starkey, Hanekom &c) 2000:70/77				* WC				

ADVANTAGES OF DONKEYS COMPARED WITH OXEN (I)	**Cheaper to buy/ oxen expensive (vii)**	**Ease of training**	**Quick to learn, gd memory, operate without super-vision**	**Ease of handling … *W/C: esp. by women/ children* (v)**	**More careful/ accurate/ straight line**	**Greater speed of walking (i)**	**More flexible in their working speeds**	**Not prone to theft … *XM: as not valued for meat (ii)***
Starkey *et al.* (Starkey, Jaiyesimi-Njobe &c) 2000:21						*		
Swai and Bwanga 2008:i	*	*		* W		*		* XM
Upadhay 1991:18							*	
Yilmaz 2011:¶1			*					
Yilmaz 2012		p35/57	p21/57	p21		p35/37		
Yilmaz 2014			* (iii)					
Yusuf *et al.* 2016:¶2				*				

(i) See APP II.28 for references on the comparative speeds of donkeys and cattle

(ii) See APP II.12 for references on the use of donkeys and oxen for meat

(iii) Unaccompanied smuggling across borders by donkeys:
Across African borders: Himeur 2003, Jones [P.A.] 2009:3, Sosovele 2004:109, Melissa Upjohn pers. comm. 2015
From Turkey into Iran and Iraq: Yilmaz 2014, Alkashif 2015
Between Lebanon and Syria: Nasser Kalawoun pers. comm. 2017

(iv) Donkeys can return home from work unaccompanied (JG Ethiopia 2014, Marshall and Weissbrod 2009:70, Starkey 1995:148)

(v) Cattle temperament can be improved by frequent contact with humans from when young and by working regularly with the same individuals (Reh 1982:77/108, Renger 1990:271, Schwabe 1994:41)

(vi) Donkeys easy to train for pack use

(vii) But oxen increase in value as are commonly used for meat at end of working life (see APP II.12)

II.3 Advantages of donkeys compared with oxen (II)

ADVANTAGES OF DONKEYS COMPARED WITH OXEN (II.a)	Far more able than cattle to withstand water shortage	Drought-tolerant	Can go water-less for up to 3 days	Suited to hot, semi-arid environments (i)	Disease-resistant	Cope well with parasite loads
Aganga *et al.* (Aganga, Letso &c) 2000:§5	*					
Anderson and Dennis 1994:382				*		
Andrianaivoarivony and Starkey 2003:9		*		*		
Barrett *et al.* 1982				p25		p40/43
Borwick 1971:121						*
Brodie 2008:303		*			*	
Burden and Thiemann 2015		p378		p377	p376-7	
Clutton-Brock 2000:31					*	
Cochin 1995:59		*				
Dahl and Hjort 1976:238	*					
Doran 1994:273		*		*		
Förster *et al.* 2013	p206	p195				
Gebreab *et al.* 2004:51						*
Gebre Wold *et al.* 2004:80						*

ADVANTAGES OF DONKEYS COMPARED WITH OXEN (II.a)	Far more able than cattle to withstand water shortage	Drought-tolerant	Can go water-less for up to 3 days	Suited to hot, semi-arid environments (i)	Disease-resistant	Cope well with parasite loads
Hagmann and Prasad 1995:231		*				
Haufiku *et al.* 2004:175		*				
Jacobs 2001:499-500		*				
Jest and Ravis-Giordani 1985:15		*				
Jones 2008a:12		*			*	
Jones [P.A.] 2009:2						*
Joubert and Kotsokoane 2000:12		*				
Kaumbutho 2003:11					*	
Kasirer-Izraely *et al.* 1994:89	*					
Köpp 2013:110	*	*				
Landais and Lhoste 1990:222		*				
Lawrence and Pearson 2002:102				*		
Lindblom 1931:9	*					
McLean *et al.* 2010:20		*				
Maloiy 1970	*					
Maloiy and Boarer 1971:40		*				
Marshall [F.] 2007:374		*				
Marshall [F.] and Weissbrod 2009	p60	p60			p73	

ADVANTAGES OF DONKEYS COMPARED WITH OXEN (II.a)	Far more able than cattle to withstand water shortage	Drought-tolerant	Can go water-less for up to 3 days	Suited to hot, semi-arid environments (i)	Disease-resistant	Cope well with parasite loads
Marshall [K.] and Ali 2004:65		*				
Mitchell 2017:35	*					
Mpande 1994		p152/154		p152		p153
Mueller and Houpt 1991:92	*					
Ogola *et al.* 2014:43				*	*	
Pearson *et al.* 2001:31		*			*	
Prasad *et al.* 1991		p234				p237
Schmidt-Nielsen 1956:377-9	*					
Schmidt-Nielsen 1964:90-92	*					
Shackelford *et al.* 2013:4171-2		*		*		
Shai *et al.* 2016:16		*				
Silikanove 2000	*					
Smith and Pearson 2005:1		*				
Sosovele 2004		p107			p107	p109
Starkey 1994a:74/76		*				
Starkey 2000a:490		*				
Starkey 2011		p12		p17/25		
Starkey *et al.* (Starkey, Hanekom &c) 2000:69/77		*			*	
Starkey *et al.* (Starkey, Jaiyesimi-Njobe &c) 2000:21		*				

ADVANTAGES OF DONKEYS COMPARED WITH OXEN (II.a)	Far more able than cattle to withstand water shortage	Drought-tolerant	Can go water-less for up to 3 days	Suited to hot, semi-arid environments (i)	Disease-resistant	Cope well with parasite loads
Swai and Bwanga 2008:i		*				
Wells *et al.* 2004					p205	p203
Yilmaz 2011:¶1	*					
Yilmaz 2012	p35		p71	p35	p35	p35/73

(i) The distribution of donkeys in modern Africa reflects their physiology (Bartosiewicz and Gyöngyössy 2006:291, Blench 2000:340, Marshall and Weissbrod 2009:60, Wilson 1981:136)

ADVANTAGES OF DONKEYS COMPARED WITH OXEN (II.b)	Cattle need a rest period during day for rumination	Cattle need good feed, long grazing times, much water	Oxen need more food/ extra before work (ii)
Akou 1994:134			*
Barrett *et al.* 1982:25/77			*
Brodie 2008:303			*
Chikura 1994:162			* (iii)
Dahl and Hjort 1976:238/241		*	
de Wilde 1967:109-10			* (iii)
Evans 1960:40	*		
Halstead 1987a:84			*
Halstead 1995:12			*
Halstead 2014:52			*
Halstead and Isaakidou 2011:62			*

ADVANTAGES OF DONKEYS COMPARED WITH OXEN (II.b)	Cattle need a rest period during day for rumination	Cattle need good feed, long grazing times, much water	Oxen need more food/ extra before work (ii)
Haufiku *et al.* 2004			*
Isaakidou 2008:105			*
Isaakidou 2011:102			*
Jabbar 1993:264			*
Jacobs 2001:488		*	
Jones 2008a:12		*	
Joubert 1995:130		*	
Köpp 2013:110		*	
McCann 1984:5			*
Marshall 2007:374	*		
Mitchell 2017:35	*	*	
Nengomasha *et al.* 2000:23			*
Orev 1972:236			*
Panin 1988:135			*
Panin and Ellis-Jones 1994:98			* (iii)
Pearson and Smith 1994:123-4			* (iii)
Phiri 1994:144			* (iii)
Reh 1982:96/104			*
Renger 1990:276			*
Russell 1988	p77	p59	
Sherratt 2006:346			*
Smith 1991:214		*	
Smith and Pearson 2005:1		*	

ADVANTAGES OF DONKEYS COMPARED WITH OXEN (II.b)	Cattle need a rest period during day for rumination	Cattle need good feed, long grazing times, much water	Oxen need more food/ extra before work (ii)
Starkey 1991:79			*
Temesgen 2000:72			*
Viebig 1982:138			*

(ii) Extra nutritional elements for feeding oxen:
Halstead 2014:52-4 Bitter vetch is valued for cattle strength, though backbreaking to harvest; hay is more nutritious than straw
King 2014:13 Herders in modern Africa know which areas of grazing are rich in desirable trace elements such as calcium and magnesium, and wild grazing animals themselves seek out vegetation with these elements
Starkey 1981b:23 Western trainers suggest extra fodder, but oxen in Sierra Leone are maintained by grazing plus minerals and leaves etc. containing vitamins

(iii) A prime issue is low quality of feed at the end of the dry season

II.4 Use of cows for ploughing

USE OF COWS FOR PLOUGHING (I)	Significant use in Asia and M East	Common and increasing in some regions of Africa …	… but less used in some other regions	Smaller than oxen, need to rest more	Accounts of comparative performance versus oxen	Resource-efficient for small-scale farmers	Increases with drought/ shortage of oxen	Increases w. fodder/ land shortage, need to maximise investment
Arbuckle 2012a:211						*		
Blench 1997:12			*					
Bobobee 1999:61			*					
Bogaard 2005:179						*		
Cole and Steinbach 1999:216-9					*			*
Dijkman *et al.* 2000:137					*			
Faftine and Mutsando 1999:212			*		*			
Fall *et al.* 2003:30		*						
Floor 2003:543	*					*		
Francis *et al.* 1999:275					*		*	
Halstead 1995:17				*	*	*		
Halstead and Isaakidou 2011					p62	p62/66		
Harun *et al.* 2000:48					*			
Isaakidou 2008:108						*		
Isaakidou 2011:101-3				*	*	*		

USE OF COWS FOR PLOUGHING (I)	Significant use in Asia and M East	Common and increasing in some regions of Africa …	… but less used in some other regions	Smaller than oxen, need to rest more	Accounts of comparative performance versus oxen	Resource-efficient for small-scale farmers	Increases with drought/ shortage of oxen	Increases w. fodder/ land shortage, need to maximise investment
Isager and Skydsgaard 1992:89					*			
Islam 1993:124-5					*	*		
Jabbar 1993					p265			p264
Johannsen 2011:14	*	*	*					
Jones 2008a:4		*						
Kramarik 1975:133						*		
Lawrence and Pearson 2002:103	* (ii)							*
McCann 1984:4			*		*		*	
McCann 1995:95							*	*
Matthewman 1987	p216-17 (i)		p216			p215	p215	p215-16
Matthewman *et al.* 1993:125-6	* (i)	*						*
Muma 1995:44		*						
Mutali 1999:320			*		*			
Muvirimi and Ellis-Jones 1999:14		*						
Palmer 1998:139	*					*		
Panin and Ellis-Jones 1994:98			*					

USE OF COWS FOR PLOUGHING (I)	Significant use in Asia and M East	Common and increasing in some regions of Africa …	… but less used in some other regions	Smaller than oxen, need to rest more	Accounts of comparative performance versus oxen	Resource-efficient for small-scale farmers	Increases with drought/ shortage of oxen	Increases w. fodder/ land shortage, need to maximise investment
Pearson and Smith 1994:125								*
Phiri 1994:144		*					*	
Prasad *et al.* 1991			p233			p234	p234/236	
Reh 1982:78				*	*			
Schmitz *et al.* 1991:55				*	*			
Sherratt 2006:336					*			
Simalenga and Pearson 2003:2					*	* (iii)		
Smith 1991:211					*			
Starkey 1991:78		*						
Starkey 1992	p19	p21				p19/21 (iii)	p19/22	p19/22
Starkey 1993:1-3	* (i)		*					
Starkey 1994a:79		*						
Starkey 2000a	p479 (i)	p496				p479/496	p479	p479
Starkey 2000b:20		*			*		*	
Starkey 2011	p12/25 (i)	p12/32				p11/25		p16/25
Starkey and Apetofia 1986:10	*							
Starkey and Mutagubya 1992:9		*						

USE OF COWS FOR PLOUGHING (I)	Significant use in Asia and M East	Common and increasing in some regions of Africa …	… but less used in some other regions	Smaller than oxen, need to rest more	Accounts of comparative performance versus oxen	Resource-efficient for small-scale farmers	Increases with drought/ shortage of oxen	Increases w. fodder/ land shortage, need to maximise investment
Starkey *et al.* (Starkey, Hanekom &c) 2000:86/105		*					*	
Tibbs 1989:13/69					*	* (iii)	*	
Viebig 1982:138				*	*			
Zerbini *et al.* 1999:209					*			

(i) Including use of cows for ploughing in Egypt

(ii) Though not in Hindu countries

(iii) Better conditions on small farms for working cow reproduction – good feeding and care

USE OF COWS FOR PLOUGHING (II)	Discussion of effect on reproduction and milk	Cows unavailable for work before and after calving	Needs more feed than an ox to maintain reproduction and milk	Net benefit is greater overall than with oxen	Allows beef cattle disposal at optimum time/ flexible herd management	Farmers prefer cows (or donkeys) to oxen introduced by authorities
Cole and Steinbach 1999:216-7			*			
Dijkman *et al.* 2000:137		*	*		*	
Faftine and Mutsando 1999:212-3	*	*				
Fall *et al.* 2003:30				*		
Halstead 1995:17	*					
Harun *et al.* 2000:48	*		*			
Isager and Skydsgaard:82	*					
Islam 1993:125	*		*	*		
Jabbar 1993:265	*		*			
Kjaerby 1983:148	*					
Larsen *et al.* 2003:51	*		*			
Lawrence and Pearson 2002:105	*					
McCann 1984:4	*					
Matthewman 1987	p217-220	p217/220	p218-219	p215/219-220	p219	
Matthewman *et al.* 1993:126	*	*	*	*	*	
Muvirimi and Ellis-Jones 1999:14				*		
Panin and Ellis-Jones 1994:98				*		

USE OF COWS FOR PLOUGHING (II)	Discussion of effect on reproduction and milk	Cows unavailable for work before and after calving	Needs more feed than an ox to maintain reproduction and milk	Net benefit is greater overall than with oxen	Allows beef cattle disposal at optimum time/ flexible herd management	Farmers prefer cows (or donkeys) to oxen introduced by authorities
Pearson and Smith 1994:122/125	*	*		*		
Prasad *et al.* 1991:236	*					
Reh 1982:79-80	*		*	*	*	
Simalenga and Pearson 2003:2	*	*	*		*	
Smith 1991:211		*	*			
Starkey 1992:21						*
Starkey 1994a:79						*
Starkey 2000b:20			*	*		
Starkey 2011	p16		p25	p16		
Starkey and Apetofia 1986:10	*					
Starkey and Mutagubya 1992:26	*					
Tibbs 1989	p13/69	p69	p69			
Wilson 2000:19	*			*		
Zerbini *et al.* 1999	p199/209-10		p199/209			

USE OF COWS FOR PLOUGHING (III): **Countries where cows are widely or increasingly used for ploughing: Asia**	
Bangladesh	Battaglia and Pearson 2011:3, Jabbar 1993:265, Matthewman 1987:216, Matthewman *et al.* 1993:125, Starkey 1992:19, Islam 1993:123 49% of cows are used for draught, accounting for c.30% of draught animals (Islam 1993:125) Up to 50% of draught animals are cows (Matthewman *et al.* 1993:125)
Indonesia	Lawrence and Pearson 2002:103, Matthewman 1987:217, Matthewman *et al.* 1993:125, Starkey 1992:19 , Starkey 1993:1 , Starkey 2011:25, Starkey and Apetofia 1986:10 'In Indonesia it has been estimated that 80% of working animals are cows or female buffaloes' (Starkey 1993:1)
Pakistan	Matthewman 1987:216, Matthewman *et al.* 1993:125
Philippines	Matthewman 1987:217, Matthewman *et al.* 1993:125
Thailand	Jabbar 1993:265, Matthewman 1987:217, Matthewman *et al.* 1993:125
China	Tibbs 1989:69
South Korea	Matthewman 1987:216
Sri Lanka	Matthewman *et al.* 1993:125
Vietnam	Starkey 2011:25
Countries where cows are widely or increasingly used for ploughing: Africa	
Cameroon	Fall *et al.* 2003:30
Egypt	Matthewman 1987:215/217, Matthewman *et al.* 1993:125, Starkey 1993:2, Starkey 1994a:70, Starkey 2000a:479, Starkey 2011:12/33
North Africa	Starkey 1994a:70, Starkey 2000a:497
Gambia	Fall *et al.* 2003:30
Senegal	Fall *et al.* 2003:30, Matthewman 1987:217, Matthewman *et al.* 1993:125, Starkey 1991:78, Starkey 1992:21
South Africa	(But varies considerably by region) Jones 2008a:4, Starkey 2000b:20, Starkey *et al.* (Starkey, Hanekom &c) 2000:86

Tanzania	Starkey and Mutagubya 1992:9
Zambia	Phiri 1994:144, Matthewman *et al.* 1993:125; minor use Mwenya *et al.* 1994:469
Zimbabwe	Francis *et al.* 1999:275, Matthewman *et al.* 1993:125, Muvirimi and Ellis-Jones 1999:14, Prasad *et al.* 1991:233-6, Wilson 2000:19
Other countries using cows for ploughing:	
Bolivia	Starkey 2011:25
Czech Republic	(19th-century AD Bohemia) Kramarik 1975:133
Germany	(mid 20th century AD) Jabbar 1993:265
Greece	(Some use) Halstead 1995:16-17, Halstead 2014:15, Isaakidou 2011:101
Guadeloupe	Matthewman *et al.* 1993:125
Hungary	Bartosiewicz *et al.* 1997:67
Israel	Sasson 2010:45
Jordan	Palmer 1998:139
Poland	Matthewman 1987:217, Matthewman *et al.* 1993:125
Portugal	Sherratt 2006:336
Spain	Isaakidou 2011:101
Turkey	Hijlke Buitenhuis pers. comm. 2015
Countries where cows little-used for ploughing:	
India	(For cultural reasons) Lawrence and Pearson 2002:103; (some use) Matthewman 1987:216
Nepal	(For cultural reasons) Lawrence and Pearson 2002:103
Ethiopia	Larsen *et al.* 2003:51, McCann 1984:4, McCann 1995:95, Matthewman 1987:217
Ghana	(Especially not used in Muslim north) Bobobee 1999:91
Nigeria	(Minor use) Blench 1997:15; (especially not used in Muslim north) Abubakar Suleiman pers. comm. 2013

II.5 Women, children and working animals

See also APP II.2 for references to donkeys being easy to handle by women

WOMEN AND WORKING ANIMALS (I)	Women are the collectors of firewood/ water (i)	Women handle the donkeys used for transport work	Donkeys reduce the work burden for women	Fewer female health problems when not load-carrying
Admassu and Shiferaw 2011:39			*	
Aganga and Seabo 2004:155	*			
Ali-Nejadfard 2000:201	*			
Anderson and Dennis 1994	p379	p382		
Ayo-Odongo *et al.* 2000:211	*		*	* (iii)
Blench *et al.* 2004:211		*		
Cochin 1995:62		*		
Doran 1994:272-3	*			
Haufiku *et al.* 2004:178		*	*	
Jacobs 2001:489			*	
Leyland 2004:102-3	*		*	
Low 1986:18	*			
Lubwama 2000:125	*	*	*	
Marshall [F.] 2007:375	*	*	*	*
Marshall [F.] and Weissbrod 2009	p59	p59/p72-3	p59	
Marshall [K.] and Ali 2004:63	*		*	

WOMEN AND WORKING ANIMALS (I)	Women are the collectors of firewood/ water (i)	Women handle the donkeys used for transport work	Donkeys reduce the work burden for women	Fewer female health problems when not load-carrying
Marshall [K.] and Starkey 1998:33	*		*	
Mpande 1994	p153-4		p154	
Mukuka 1994:293	*		*	
Mutemi 2008:69	*	*	*	
Mutua and Mwangi 2000:205	*			
Mwanzia 2000:240	*		*	
Ochieng 2011:¶5		*		
Pearson *et al.* 2001:2/27			*	
Pritchard 2014:3				*
Spencer 1973:14	*	*		
Starkey 1994b:1	*		*	
Starkey and Fernando 1998:§1	*		*	
Sylwander 1994:262	*	*	*	
Twerda *et al.* 1997:48/51	*	*	*	
Valette 2014	p41		p35 (v)	p41
van Dijk 2011:¶6	*	*	*	
Wambui *et al.* 2004:27	*	*	*	
Yilmaz 2011:35		*		

(i) See also APP II.7 for references to use of donkeys for carrying water and firewood.

(ii) In some cultures in Africa, although donkeys are available, women still carry water, firewood or other goods (e.g. Doran 1994:275, Leyland 2004:103, Sieber 2004:120)

(iii) Child health is also improved when the load-carrying is transferred to donkeys

(iv) Cultural factors in women not using ploughing cattle:
Ploughs and cattle are too heavy and difficult for women (Bwalya and Akombelwa 1999:83, Henriksson and Lindholm 2000:40)
It is unsuitable for women to handle cattle (Bwalya 2004:131, Fowler 1999:271)
Women reluctant to handle cattle or use heavy ploughs (Bwalya 2004:131, Lubwama 2000:125)

(v) Use of donkeys for burden-carrying frees women to carry their infants with them, improving child-care

WOMEN AND WORKING ANIMALS (II)	Donkeys low-status/ not associated with male power	Men and women employ donkeys for different purposes	Cultural/ economic barriers to women using donkeys for fuel/ water (ii)	Women culturally/ socially deterred from handling ploughing oxen	Women do plough in some African regions
Admassu and Shiferaw 2011:39				*	
Aganga and Seabo 2004:155		*	*		
Anderson and Dennis 1994:382				*	
Blench 1997:15/30				*	
Bwalya 2004:131				* (iv)	
Bwalya and Akombelwa 1999:83				* (iv)	
Cochin 1995:62	*				
Comaroff 1985				*	
Fowler 1999:271				* (iv)	
Goody 1976:35				*	

WOMEN AND WORKING ANIMALS (II)	Donkeys low-status/ not associated with male power	Men and women employ donkeys for different purposes	Cultural/ economic barriers to women using donkeys for fuel/ water (ii)	Women culturally/ socially deterred from handling ploughing oxen	Women do plough in some African regions
Henriksson and Lindholm 2000:40				* (iv)	
Jacobs 2001:489	*			*	
Jotheri 2014		*			
Kjaerby 1983:62					*
Leyland 2004:102-3			*		
Long 1968:22				*	*
Lubwama 2000:125				* (iv)	
Marshall [F.] 2007:378	*				
Marshall [F.] and Weissbrod 2009	p72		p67		
Marshall [K.] and Ali 2004			p63	p65	
Marshall [K.] and Starkey 1998:33	*				
Mpande 1994:152-3	*				
Mukuka 1994:293				*	
Muma 1995:44				*	
Mutemi 2008:69		*			
Mutua and Mwangi 2000:205/207			*		
Panin 1988:96				*	
Pearson *et al.* 2001:24			*		
Peters 1986				p146-50	p144
Schmitz *et al.* 1991:85				*	
Sieber 2004:120			*		
Sosovele 1994:319			*		
Starkey 1991:83				*	*

WOMEN AND WORKING ANIMALS (II)	Donkeys low-status/ not associated with male power	Men and women employ donkeys for different purposes	Cultural/ economic barriers to women using donkeys for fuel/ water (ii)	Women culturally/ socially deterred from handling ploughing oxen	Women do plough in some African regions
Starkey 2011:11/27	*			*	
Sylwander 1994	p262			p260/262-3	p262
Valette 2014		p18/24			
Wambui *et al.* 2004	p27	p28			
Yilmaz 2011:35				*	

CHILDREN AND WORKING ANIMALS	Children commonly herd working animals for grazing	Children/ youths commonly lead donkeys	Women can delegate tasks with donkeys to children
Anderson and Dennis 1994:382		*	
Barrett *et al.* 1982:65-6	*		
Bogucki 1993:498	*		
Cochin 1995:62		*	
Doran 1994:272		*	
Halstead 2014:50	*		
Kreike 2010:98-9	*		
Kruit 1994:479	*		
Landais and Lhoste 1990:224	*		
McCann 1984:4	*		
Mudamburi *et al.* 2003:26	*		
Ndiamé 1988:257	*		

CHILDREN AND WORKING ANIMALS	Children commonly herd working animals for grazing	Children/ youths commonly lead donkeys	Women can delegate tasks with donkeys to children
Singh 1988:31	*		
Starkey 1994a:75	*		
Starkey 1994b:1		*	*
Starkey 1998d:22		*	*
Starkey 2011:11	*		
Starkey and Fernando 1998:§2		*	*
Starkey and Mutagubya 1992:9		* (vi)	
Starkey *et al.* (Starkey, Hanekom &c) 2000:105		*	
Wambui *et al.* 2004:27		*	

(vi) 'Carts [with cattle or donkeys] allow certain laborious and time-consuming tasks, such as water collection, to be delegated to children and youths.'

WOMEN IN MESOPOTAMIA	Evidence of low-status women in 4th- 3rd m BC Mesop. texts	Women in manufacturing in 4th-m BC Mesop.
Adams 2001:355		*
Adams 2008:11	*	*
Algaze 2007:355-6		*

WOMEN IN MESOPOTAMIA	Evidence of low-status women in 4th- 3rd m BC Mesop. texts	Women in manufacturing in 4th-m BC Mesop.
Asher-Greve 2013	p368	p361/367
Breniquet 2016:20-22	*	*
Lafont 2016:154-7	*	*
Lecompte 2016:29/50	*	
Liverani 2006:45	*	*
McCorriston 1997:517/527-8/533/537	*	*
Pollock 1999:104		*
Schoop 2013	*	*
Stol 2016:300-303/683-91	*	
Wright 1996	p91/93/98	p79/89

II.6 Harness

EARLY HARNESS	Discussion of cattle nose-rings/ ropes … *M: modern*	Discussion of equid nose-fastenings/ lip-rings … *M: modern*	Discussion of equid low noseband/ muzzle	Discussion of early bit evidence	Simple traces in antiquity for sledges (i)	Yokes in 4th/ 3rd m BC Mesopotamia
Anthony 2007:193				*		
Anthony and Brown 1989:102		*		*		
Anthony and Brown 2000:82-3				*		
Anthony and Brown 2010				*		
Bakker *et al.* 1999:787					*	*
Barclay 1980		p103		p116		
Black *et al.* 1998-2006a:¶20-33						*
Brownrigg 2006		p165-6/170	p165-6	p165-70		
Burford 1960:18						*
Champlot *et al.* 2010		*				
Civil 1994:58						*
Clutton-Brock 1992:71-2						*
Clutton-Brock 2001:336-8				*		
Desai and Salgar 210:405	* M					
Dietz 2003:191				*		
Downs 1961:1195		*				

EARLY HARNESS	**Discussion of cattle nose-rings/ ropes … *M: modern***	**Discussion of equid nose-fastenings/ lip-rings … *M: modern***	**Discussion of equid low noseband/ muzzle**	**Discussion of early bit evidence**	**Simple traces in antiquity for sledges (i)**	**Yokes in 4th/ 3rd m BC Mesopotamia**
Halstead and Isaakidou 2011:68					*	*
Heimpel 1994:10		*				
Inns 1980:6	*					
JG Burkina Faso 2013	* M					
Kerman 1985:17	* M					
Levine 1999a:33				*		
Littauer [1969] 2002		p498	p498	p499-501		
Littauer [1983] 2002:10						*
Littauer and Crouwel 1979	p14	p30/60	p30-31			p11/14/28
Littauer and Crouwel 2001:329-333				*		
Littauer and Crouwel [1973] 2002:365-6	*					
Maekawa 1979b:44						*
Moorey 1970			p41	p42/44		
Noble 1969		p486	p486			p486-7
Oates 2003:120		*				
Olsen 2006:92/94				*		
Pearson *et al.* 2003:3				*		
Potts 1997:83-4						*
Renger 1990:273/275						*
Sallaberger 1998:174						*
Sherratt 2003					p249	p243/244/249

EARLY HARNESS	Discussion of cattle nose-rings/ ropes … *M: modern*	Discussion of equid nose-fastenings/ lip-rings … *M: modern*	Discussion of equid low noseband/ muzzle	Discussion of early bit evidence	Simple traces in antiquity for sledges (i)	Yokes in 4th/ 3rd m BC Mesopotamia
Sherratt 2006					p342	p344/346
Starkey 1981a:12	* M					
Stol 1995:189-190						*
Twerda *et al.* 1997:51		* M				
Viebig 1982:152	* M					
Wapnish 1997:335				*		
Weber 2008:502/505/515		*				
Zarins 2014:256		*				

(i) Littauer and Crouwel (1979:11/14) do not concur

HARNESS FACTORS (I)	Donkeys said to need more complex plough harness	Donkeys have thin skin/ get harness sores	Equids have strength in chest not neck	Yokes used for donkeys today	Yoke-saddle improves yoked equid efficiency	Factors relating to yoke use
Bakker *et al.* 1999:787						*
Barker 1964:76				*		
Behera *et al.* 2008:29						*
Bulliet 1975:177			*			*
Burford 1960:1						*
Bwalya 2004:130	*					

HARNESS FACTORS (I)	Donkeys said to need more complex plough harness	Donkeys have thin skin/ get harness sores	Equids have strength in chest not neck	Yokes used for donkeys today	Yoke-saddle improves yoked equid efficiency	Factors relating to yoke use
Chadborn 2008:59	*	*	*			*
Civil 1994:58						*
Clutton-Brock 1992			p66-71			p71
Dennis 1996			p143	p146		p138-146
Dietz 2003:189						*
Fielding and Krause 1998:13		*				
Forbes 1955:82-4						*
Geza 1999			p146			p143-6
Hagmann and Prasad 1995:237			*	*		
Halstead 2014:36				*		
Halstead and Isaakidou 2011:68						*
Hamid 2004:84		*				
Inns 1980:6	*	*				
Jones 2008a:4			*			
Joubert and Kotsokoane 2000:12	*					
Kelekna 2009:97					*	*
Kerman 1985:17	*					
Kramarik 1975:134						*
Krause 1995	p21			p19	p21	
Littauer [1968] 2002			p483		p479-84	p479/483
Littauer [1983] 2002	p10				p18	p10
Littauer and Crouwel 1979			p11/29			p11/28

HARNESS FACTORS (I)	Donkeys said to need more complex plough harness	Donkeys have thin skin/ get harness sores	Equids have strength in chest not neck	Yokes used for donkeys today	Yoke-saddle improves yoked equid efficiency	Factors relating to yoke use
McCann 1984:8						*
Patrick *et al.* 2000:259			*			
Pearson *et al.* 2003:8		*	*			*
Prasad *et al.* 1991:236	*			*		*
Reh 1982:132		*				
Sosovele 2004:108			*	*		*
Spruytte 1983			p11-15			p9-15
Starkey 1988:107	*					*
Starkey 1989			p45-6	p42		p39
Upadhay 1991:18			*			
Viebig 1982:145			*			
Wambui *et al.* 2004:27		*				

HARNESS FACTORS (II)	Harness strongly affects performance/ adoption	Ineffective harness still widely used today	Equids in many regions trained to respond to voice/ light touch	Fabric commonly used for harness today
Audiot and Garnier 1995:66			*	
Behera *et al.* 2008:29	*			
Brownrigg 2006:165			*	
Bulliet 1975:23/177	*			
Burford 1960:18		*		

HARNESS FACTORS (II)	Harness strongly affects performance/ adoption	Ineffective harness still widely used today	Equids in many regions trained to respond to voice/ light touch	Fabric commonly used for harness today
Chadborn 2008:59				*
Davis 2011:¶4		*		
Dennis 1996		p138		p148
Hagmann and Prasad 1995:237	*			
JG Burkina Faso 2013			*	*
McLean *et al.* 2010			*	
Mutua and Mwangi 2000:205		*		
Schmitz *et al.* 1991:79			*	
Spruytte 1983:11		*		
Starkey 1998a:9		*		
Starkey and Apetofia 1986:16			*	
Swai and Bwanga 2008:iii		*		
Upadhyay 1991:18	*			
Wambui *et al.* 2004:27-8				*
Wells *et al.* 2004:203		*		
Yilmaz 2012:57	*			

II.7 Short-distance donkey transport

SHORT-DISTANCE DONKEY TRANSPORT (I): ITEMS CARRIED	Water (i)	Firewood (i)	Crops from the field (v)	Crop residue/ fodder to animals	Crops & other goods to market/ mill (ii)	Goods home from market	Agricult-ural supplies (fertiliser, seed)	Implem-ents to/ from fields
Admassu and Shiferaw 2011			p24	p51	p24	p24		
Aganga and Seabo 2004:154	*	*						
Aganga and Tsopito 2004:159	*	*						
Ali-Nejadfard 2000:201	*	*						
Anderson and Dennis 1994	p379	p379	p378		p380			
Ayo-Odongo *et al.* 2011:211			*					
Barrett *et al.* 1982	p6/51 (£)	p6/51 (£)	p6	p6/51 (£)	p6/51 (£)			
Blench *et al.* 2004:212	*		*		*			
Brodie 2008:303			*					
Catley and Blakeway 2004:87	*	*						
Charles 1990:55			*					
de Aluja and Lopez 1991	p3		p3		p3			p1
Dijkman and Sims 2004:228				*	*			
Doran 1994:272	*	*	*					

SHORT-DISTANCE DONKEY TRANSPORT (I): ITEMS CARRIED	Water (i)	Firewood (i)	Crops from the field (v)	Crop residue/ fodder to animals	Crops & other goods to market/ mill (ii)	Goods home from market	Agricult-ural supplies (fertiliser, seed)	Implem-ents to/ from fields
Doumbia 2014:35	*	*						
Fielding 1987	p25	p27					p23	
Floor 2003			p219	p543				
Gebreab 1992:104	*	*		*	*			
Gebreab 1998:16					*	* (vii)		
Gebreab *et al.* 2004:48	*	*	*	*	*		*	
Halstead 1987a:84			*					
Halstead and Isaakidou 2011:62			*					*
Halstead 2014			p50/70	p50				
Halstead and Jones 1989:48			*					
Hamid 2004:85				*				
Hanekom 2004:192	*	*						
Jacobs 1975:408	*							
Janssen *et al.* 2003:27	*	*						
Jest and Ravis-Giordani 1985:15	*				*			
JG Burkina Faso 2013	*	*			*	*		*
JG Ethiopia 2014		*	*		*	* (vii)		*
Jaafar Jotheri pers. comm. 2014					*			
Kendagore and Njoroge 2014:39	* (W£)	* (W£)				* (W£)		

SHORT-DISTANCE DONKEY TRANSPORT (I): ITEMS CARRIED	Water (i)	Firewood (i)	Crops from the field (v)	Crop residue/ fodder to animals	Crops & other goods to market/ mill (ii)	Goods home from market	Agricult-ural supplies (fertiliser, seed)	Implem-ents to/ from fields
Kjaerby 1983:27				*				
Kreike 2010:100	*	*			*			
Landais and Lhoste 1990:222			*				*	*
Leyland 2004	p102-3	p102	p102		p102			
Lubumbe 1994:293	*	*			*			
Lubwama 2000:125	*	*	*				*	
McDowell 1999:75	*							
Marshall [F.] 2007	p374	p374		p375		p374		
Marshall [F.] and Weissbrod 2009	p59/67	p67			p67	p67		
Marshall [K.] and Starkey 1998:33	* (£)	* (£)		* (£)	* (£)			
Mpande 1994:154	*	*	*		*			
Mudamburi *et al.* 2003:17	*	*						
Mukuka 1994:293	*	*	*		*			
Mutemi 2008:69	*	*	*		*			
Mwanzia 2000:240	*	*			*			
Nicolaisen 1963:110	*							
Ochieng 2011	¶2			¶7				
Osborn and Osbornová 1998:135 (vi)			*					
Carol Palmer pers. comm. 2015	*							

SHORT-DISTANCE DONKEY TRANSPORT (I): ITEMS CARRIED	Water (i)	Firewood (i)	Crops from the field (v)	Crop residue/ fodder to animals	Crops & other goods to market/ mill (ii)	Goods home from market	Agricult-ural supplies (fertiliser, seed)	Implem-ents to/ from fields
Pearson *et al.* 2001	p20/27	p1/15 (£)	p2/15/20/27	p15/20	p2-3/20-22	p2/20		
Pratt 2011	¶2			¶3				
Pritchard 2014:3	*			*				
Reed 2011:7			*					
Robinson 1977:10		*						
Sieber 2004			p120				p119	
Spencer 1973:14	*							
Starkey 1991:83			*	*	*			
Starkey 1994a:70		*		*	*			
Starkey 1994b:1	*							
Starkey 1998a:9	*				*			
Starkey 1998d:22	*							
Starkey 2011	p26	p26	p11/33	p33	p11	p11		
Starkey and Fernando 1998:§1	*							
Starkey *et al.* (Starkey, Hanekom &c) 2000:105			*					
Abubakar Suleiman pers. comm. 2013	*		*		*			
Sylwander 1994:262	*	*	*		*			
Tabbaa 2003			p5	p5				p6
Tibbs 1989:62	*	*	*					
Twerda *et al.* 1997	p48/51	p51						

SHORT-DISTANCE DONKEY TRANSPORT (I): ITEMS CARRIED	Water (i)	Firewood (i)	Crops from the field (v)	Crop residue/ fodder to animals	Crops & other goods to market/ mill (ii)	Goods home from market	Agricult-ural supplies (fertiliser, seed)	Implem-ents to/ from fields
Valette 2014	p18/24/26-7/34 (W£)	p18/24/26-7/34 (£)	p18/34-35	p18/23/26/34/41 (W£)	p19/26 (W£)	p26/34 (W£)	p26 (W£)	
Valette and Upjohn 2014:16-17	*	*		*	*	*		
van Dijk 2011:¶1	*	*						
Waithanji 2009:31-2/36/39	*	*	*	* (£)	*	*		
Waithanji 2014	p31/32 (£)		p2		p2/39 (£)			
Wambui *et al.* 2004:25	*	*						
Wells *et al.* 2004:207	*		*					
Wilson 1991:42	*	*	*			*		
Zaman *et al.* (Zaman, Kumar and Compston) 2014:19						* (£)		
Zaman *et al.* (Zaman, Upjohn and Valette) 2014:159-60				*	*	*		
Zenebe and Fekade 2004:69						* (vii)		

SHORT-DISTANCE DONKEY TRANSPORT (II): ITEMS CARRIED, AND INCOME (£ = Carried for others for income; W£ = Carried in particular by women for income)	**Manure, for agric-ulture, fuel or constr-uction**	**Construct-ion/ raw materials (iii)**	**Refuse**	**Household goods during seasonal moves**	**Old/young/ sick/ injured people & the dead (iv)**	**Injured/ young/ small/ dead animals**	**Income fr carrying (& see APP II.11) *… W: women, F: farmers***	**Income through donkey transpt still largely by men**
Abdel-Majid 2008:441				*				
Admassu and Shiferaw 2011		p45	p45		p8/24/45	p8	p8-9/23/27/45-8 W	
Aganga and Seabo 2004		p154						p155
Anderson and Dennis 1994	p381	p382						
Bansal *et al.* 1988:142							*	
Barrett *et al.* 1982		p6/51 (£)					p6/51-3/77/106 F (viii)	
Blench *et al.* 2004	p212	p212		p211	p211	p211	p212	
Canacoo 2004:222			*					
Catley and Blakeway 2004:87				*		*		
de Aluja and Lopez 1991:3			*					
Doumbia 2014:35		*	*				*	
Fahmy 2004:238			*					
Fernando and Starkey 2004:20							* W	
Fielding 1987:23	*							
Gebreab 1992:104	*	*						

SHORT-DISTANCE DONKEY TRANSPORT (II): ITEMS CARRIED, AND INCOME (£ = Carried for others for income; W£ = Carried in particular by women for income)	**Manure, for agric-ulture, fuel or constr-uction**	**Construct-ion/ raw materials (iii)**	**Refuse**	**Household goods during seasonal moves**	**Old/young/ sick/ injured people & the dead (iv)**	**Injured/ young/ small/ dead animals**	**Income fr carrying (& see APP II.11) … *W: women, F: farmers***	**Income through donkey transpt still largely by men**
Gebreab 1998:16	*	*						
Gebreab *et al.* 2004	p48				p49			
Halstead 2014:70	p70/213	p70						
Halstead and Isaakidou 2011:66						* (vii)		
Hanekom 2004:192	*							
Isager and Skydsgaard 1992:105		*						
Jacobs 1975:408				*				
Janssen *et al.* 2003:27	*							
Jest and Ravis-Giordani 1985:15	*	*						
JG Ethiopia 2014							*	
Jaafar Jotheri pers. comm. 2014 (Iraq)								*
Kandpal *et al.* 2014:37		* (£)					*	
Kendagore and Njoroge 2014:39							* W	
Kreike 2010:96						* (vii)		
Kruit 1994:476							*	
Landais and Lhoste 1990:222					*			

SHORT-DISTANCE DONKEY TRANSPORT (II): ITEMS CARRIED, AND INCOME (£ = Carried for others for income; W£ = Carried in particular by women for income)	**Manure, for agric-ulture, fuel or constr-uction**	**Construct-ion/ raw materials (iii)**	**Refuse**	**Household goods during seasonal moves**	**Old/young/ sick/ injured people & the dead (iv)**	**Injured/ young/ small/ dead animals**	**Income fr carrying (& see APP II.11) *… W: women, F: farmers***	**Income through donkey transpt still largely by men**
Leyland 2004	p102	p103		p102	p102			
Lindblom 1931:42				*				
Lubwama 2000:125		*						
Marshall [F.] 2007:374				*	*	*		
Marshall [F.] and Weissbrod 2009				p67/69	p67	p67 (vii)		
Marshall [K.] and Ali 2004:65							* W	
Marshall [K.] and Starkey 1998:33					*		* W	*
Mitchell 2017:35				*				
Mudamburi *et al.* 2003:17					*			
Mutua and Mwangi 2000:207							*	
Mwanzia 2000:240		*		*				
Nengomasha *et al.* 2000:22							* W	
Nicolaisen 1963:109				*				
Ochieng 2011:¶7							* W	
Orev 1972:236							*	
Osborn and Osbornová 1998:135 (vi)		*				*		

SHORT-DISTANCE DONKEY TRANSPORT (II): ITEMS CARRIED, AND INCOME (£ = Carried for others for income; W£ = Carried in particular by women for income)	**Manure, for agric-ulture, fuel or constr-uction**	**Construct-ion/ raw materials (iii)**	**Refuse**	**Household goods during seasonal moves**	**Old/young/ sick/ injured people & the dead (iv)**	**Injured/ young/ small/ dead animals**	**Income fr carrying (& see APP II.11) … *W: women, F: farmers***	**Income through donkey transpt still largely by men**
Carol Palmer pers. comm. 2015			*					
Pearson *et al.* 2001	p20	p1/15			p20		p2-3/15/22 F	p25
Pratt 2011:¶1-2							* W	
Pritchard 2014:3	*	* (W£)				*	* W	
Robinson 1977:10	*							
Simoons 1960:Fig.76						*		
Spencer 1973:14				*				
Starkey 1991:83	*							
Starkey 1994a	p75	p70					p75	
Starkey 1998d:22	*							
Starkey *et al.* (Starkey, Hanekom &c) 2000:105		*						
Starkey 2011:11	*							
Abubakar Suleiman pers. comm. 2013		*						
Tabbaa 2003			p6		p5			
Twerda *et al.* 1997				p48/51	p51			
Valette 2014	p26/36/40 (W£)	p18-19 (£)	p18-19/26/38 (W£)			p35	p18-19/38/40 W	p26

SHORT-DISTANCE DONKEY TRANSPORT (II): ITEMS CARRIED, AND INCOME (£ = Carried for others for income; W£ = Carried in particular by women for income)	**Manure, for agric-ulture, fuel or constr-uction**	**Construct-ion/ raw materials (iii)**	**Refuse**	**Household goods during seasonal moves**	**Old/young/ sick/ injured people & the dead (iv)**	**Injured/ young/ small/ dead animals**	**Income fr carrying (& see APP II.11) … *W: women, F: farmers***	**Income through donkey transpt still largely by men**
Valette and Upjohn 2014:16-17	*		*				* W	
van Dijk 2011:¶4							*	
Waithanji 2009:8/30-32							* F	
Wells and Krecek 2001:40							*	
Yilmaz 2011:¶1						*		
Yilmaz 2012:60						*		
Zaman *et al.* (Zaman, Kumar and Compston) 2014:19		* (£)			* (£)			
Zaman *et al.* (Zaman, Upjohn and Valette) 2014:159-60	*	*			*			
Zenebe and Fekade 2004							*	

(i) See APP II.5 on instances of cultural barriers to women using donkeys for carrying firewood and water

(ii) Kenyan women own donkeys but still carry goods to market on their backs (Mutua and Mwangi 2000:207)

(iii) Construction and raw materials:
Construction materials: straw, grass, mud, wood, sand, stones; and soil from building sites (Isager and Skydsgaard 1992:105)
Raw materials: clay, ore, charcoal, wool, flax, and water for e.g. brick-making (Anderson and Dennis 1994:382)

Wood for construction and implements important in arid regions (Barrett *et al.* 1982:6, Gebreab 1998:16, Ochsenschlager 1992:47)
Sand (Pearson *et al.* 2001:1)
Bricks are considered too heavy for female donkey-owners to deal with (Valette 2014:24)
Seasonal – donkey owners look for agricultural labour at other times (Kandpal *et al.* 2014:37-8)

(iv) People:
Kenyan Maasai prefer human porterage for bodies (Leyland 2004:102)
Donkeys used by pastoralists in their seasonal moves to transport the young, the old and the disabled (Blench *et al.* 2004:211, Leyland 2004:102, Marshall 2007:374, Marshall and Weissbrod 2009:67)

(v) Crops from the field:
Speedier transport to storage or market reduces the risk of vermin, animal and human theft, insect and mould damage (Anderson and Dennis 1994:379, Ayo-Odongo *et al.* 2000:211 , Halstead 2014:70, Sieber 2004:120, Starkey 1991:83)
(Recent Iran) Crops taken by donkey to collection point in field, then by bullock and donkey to threshing-place (Floor 2003:219)

(vi) Tomb depictions from 3rd-millennium BC Egypt (Osborn and Osbornová 1998:135)

(vii) Including carcasses of hunted animals and of slaughtered domestic animals

(viii) Most is done in the dry season when few farming tasks; much income is in kind (Barrett *et al.* 1982:52)

II.8 Zebu cattle in Africa

ZEBU CATTLE IN AFRICA	Native African taurines hybridised with Asian zebu	Zebu more suited than taurines to hot, dry environments	Taurines more resistant to trypanosomiasis	Zebu larger than native African cattle
Barrett *et al.* 1982:33			*	*
Bradley and Magee 2006	p322-4	p317	p324	
Clutton-Brock 2012:110	*		*	
Epstein and Mason 1984:14		*		
Gifford-Gonzalez 1998	p167/193	p193		
Hanotte *et al.* 2002:336	*	*		
Havard *et al.* 2007:29			*	
Lhoste 2004:128		*		
MacHugh *et al.* 1997:1072		*	*	
Maloiy and Boarer 1971:37		*		
Marshall 1989	p235	p236	p237	
Matthews 2002	p440	p440/444		
Schmidt-Nielsen 1964:71-9		*		
Starkey 1991:91			*	
Starkey1 1994a:71	*		*	*
Starkey 1994c:307			*	

II.9 Donkey and cattle physiology

DONKEY PHYSIOLOGY (I)	Flexible neck (i)	Leg conformation resists shock	Jolting gait at speed	Ankle configuration/ gait efficient	Coat protection from insects/ heat
Alexander and Dimery 1985:511				*	
Borwick 1970:236					*
Borwick 1981:14			*		
Clutton-Brock 1992	p71		p66		
Denis 1995		p39	p39		p38
Dijkman 1992:155				*	
Gilbert 1991:100		*			
Jones 2008a:12				*	
Kelekna 2009:11	*				
Littauer and Crouwel 1979:29	*				
Marshall 2007:374				*	
Marshall and Weissbrod 2009:60				*	
Mueller and Houpt 1991:92					*
Mulanda *et al.* 2000:306					*
Rees 1984:17	*				
Shackelford *et al.* 2013:4171-77		*			
Smith and Pearson 2005:1				*	

DONKEY PHYSIOLOGY (I)	Flexible neck (i)	Leg conformation resists shock	Jolting gait at speed	Ankle configuration/ gait efficient	Coat protection from insects/ heat
Vila 1998:46		*			
Yousef and Dill 1969:683				*	
Yousef *et al.* 1972:337-9				*	

(i) Contra Brownrigg 2006:165

DONKEY PHYSIOLOGY (II)	Donkeys are hardy	Donkeys have energy-saving adaptations	Donkeys better on rocky uneven ground….. (i)	…..Cattle better on soft, heavy ground	Impact of loading/ harness on donkey capacity
Anderson and Dennis 1994:382	*				
Binger 1892:490				*	
Burden and Thiemann 2015:378			*		
Dennis 1996:143	*				
Digard 1982:139			*		
Dijkman 1992:155		*	*		*
Doran 1994:273	*				
Epstein 1984:177	*				
Fahmy 2004:238					*
Inns 1980:6	*				
Jest and Ravis-Giordani 1985:15	*				

DONKEY PHYSIOLOGY (II)	Donkeys are hardy	Donkeys have energy-saving adaptations	Donkeys better on rocky uneven ground….. (i)	…..Cattle better on soft, heavy ground	Impact of loading/ harness on donkey capacity
Joubert and Kotsokoane 2000:12	*				
Langdon 1986:255			*		
Lindblom 1931:32			*		
Marshall 2007:374			*		
Mattingly *et al.* 2007:344			*		
Pearson *et al.* 2001:32	*				
Phiri 1994:144	*				
Raziq *et al.* 2010:112	*				
Riemer 2013:99			*		
Shackelford *et al.* 2013:4172			*		
Shai *et al.* 2016:11			*		*
Smith and Pearson 2005:5		*	*		
Starkey 2011	p11		p17		
Tibbs 1989:6	*				
Uerpmann 1987:37			*		
Yilmaz 2012	p69				p57
Yousef and Dill 1969:681		*			
Yousef *et al.* 1972:337-9		*			

(i) Though Joubert (1995:129) reports that in the 17th century AD the South African trekkers took oxen over rocky passes in mountain ranges

DONKEY HOOVES	Hard, narrow hooves	Use hooves to attack predators	Use hooves to dig for water	Hooves suffer if not on hard/ dry ground	Suffer less foot damage than cattle (i)
Burden and Thiemann 2015:378	*			*	
Clutton-Brock 1992:73				*	
Cochin 1995:60	*				
Denis 1995:39	*				
Fielding 1988:2	*			*	
Fielding and Krause 1998:9	*				
Forbes 1955:84					*
Förster *et al.* 2013:204	*			*	
Gilbert 2002:17	*				
Groves 1974:106	*				
Langdon 1986:255					*
Lindblom 1931:32					*
Littauer and Crouwel 1979:11	*				
McKnight 1958:169			*		
Marshall 2007:375			*		
Marshall and Weissbrod 2009:73			*		
Nicolaisen 1963:107			*		
Rees 1984:18	*				
Roth 1980:135					*
Schmidt-Nielsen 1964:83		*			
Tibbs 1989:61					*
Urga and Abayneh 2007:5					*
Vila 1998:46	*				

DONKEY HOOVES	Hard, narrow hooves	Use hooves to attack predators	Use hooves to dig for water	Hooves suffer if not on hard/ dry ground	Suffer less foot damage than cattle (i)
Walton and Feild 1990:88		*			
Wambui *et al.* 2004:24				*	
Yilmaz 2012	p17	p23			

(i) Contra Fielding and Krause 1998:13

II.10 Hiring, lending and sharing of ploughing oxen

HIRING, LENDING AND SHARING OF PLOUGHING OXEN	Inequality from being oxenless	Hiring of oxen leads to ownership	Advantages of hiring rather than owning oxen	Hiring out oxen important for return on investment	Ox-owners hire selves w team… *W: benefic. to women farmers*	Hiring of oxen in return for labour/ cash/ produce	Cattle-loaning system	Neighbours teaming up single animals
Aganga and Seabo 2004:154							*	
Astatke and Mohammed-Saleem 1994:304								*
Blench 1997:15				*		*		
Bogucki 1993:498						*		
Bradbury 2010:7					*	*		
Bwalya 2004:131					* W			
Comaroff 1985:69							*	

HIRING, LENDING AND SHARING OF PLOUGHING OXEN	**Inequality from being oxenless**	**Hiring of oxen leads to ownership**	**Advantages of hiring rather than owning oxen**	**Hiring out oxen important for return on investment**	**Ox-owners hire selves w team… *W: benefic. to women farmers***	**Hiring of oxen in return for labour/ cash/ produce**	**Cattle-loaning system**	**Neighbours teaming up single animals**
de Wilde 1967:108				*	*			*
Delgado and McIntire 1982:190-94			*					
Farnham 1997					p102	p102-4		p102-5
Hailu 1990		p100	p98-100					
Halstead 1995:16-17	*							
Halstead 2014	p17			p118		p17/42		p176
Hesse and Runge-Metzger 1999		*	*					
Islam 1993:124				*				*
Kakwaba and van Leeuwen 1999		p310			p308	p308		
Kjaerby 1983	p61	p61		p62				
Lawrence and Pearson 2002			p107	p104				
Long 1968:24			*		*			
McCann 1984:8-9						*	*	*
McCann 1995	p78					p80		p78
McCown *et al.* 1979:305				*				
Mukuka 1994:294	*							*
Muma 1995:45		*						
Otchere *et al.* 1988:235					*			
Patrick *et al.* 2000:258							*	

HIRING, LENDING AND SHARING OF PLOUGHING OXEN	**Inequality from being oxenless**	**Hiring of oxen leads to ownership**	**Advantages of hiring rather than owning oxen**	**Hiring out oxen important for return on investment**	**Ox-owners hire selves w team… *W: benefic. to women farmers***	**Hiring of oxen in return for labour/ cash/ produce**	**Cattle-loaning system**	**Neighbours teaming up single animals**
Pearson and Smith 1994:123				*				*
Peters 1986	p140				p146-50 W	p150		
Pullen 1992:53				*				
Shenk *et al.* 2010:72							*	
Sosovele 1994:318								*
Spiess 1994:§4	*				*	*		*
Starkey 1991:82-3					* W			
Starkey *et al.* (Starkey, Hanekom &c) 2000:105					*			*
Tiffen 1976:128-31				*				
Vall *et al.* 2002b:125	*	*				*		
Westneat *et al.* 1988		p337			p336			
Wilson 2000:21				*		*		

II.11 Hiring, lending and sharing of donkeys

HIRING, LENDING AND SHARING OF DONKEYS (W = including for women)	Lent to help friends/ relatives – respect/ status, social bonding	Hired out (with owner, and sometimes with cart) as a source of income
Admassu and Shiferaw 2011	p8	p27 W
Aganga and Tsopito 2004:159	*	*
Anderson and Dennis 1994:382		* W
Ayo-Odongo *et al.* 2000:211		* W
Blench *et al.* 2004:212		*
Catley and Blakeway 2004:88		*
Crane 2011:2		*
Halstead 2014:110	*	
Hamid 2004:85		*
Kjaerby 1983:159		*
Kruit 1994:476		*
Nengomasha *et al.* 2000:22		* W
Ochieng 2011:¶7		* W
Pearson *et al.* 2001	p23/28	p22-3

HIRING, LENDING AND SHARING OF DONKEYS (W = including for women)	Lent to help friends/ relatives – respect/ status, social bonding	Hired out (with owner, and sometimes with cart) as a source of income
Pritchard 2014:3	* W	
Swai and Bwanga 2008:§4.4	*	
Valette 2014:42	* W	
Valette and Upjohn 2014:16-17	* W	
Waithanji 2009:8		*
Zenebe and Fekade 2004:71		*

II.12 Oxen and donkeys for meat

OXEN AND DONKEYS FOR MEAT – ANCIENT NEAR EAST	Evidence that domesticated donkeys in ANE not habitually eaten	Donkeys disposed of whole/ without butchery marks	Donkeys mentioned in 3rd m BC texts as being fed to dogs *(L = or lions)*	References to Drehem 3rd-m BC admin centre
Alhaique 2008:354	* (i)			
Brodie 2008:304	*			
Bulliet 2005:150	*			
Galvin 1987:126				*
Greenfield *et al.* 2012:25	*			
Grigson 1995:258	*	*		
Grigson 2003:220	* (ii)	* (ii)		
Hilgert 2003				*
Maekawa 1979b:52-55				*
Oates 2003:117			* L	*
Ovadia 1992:20	*	*		
Payne 1988	p103	p99-103		
Philip 2001:188	*	*		
Postgate 1986	p204		p203	p198
Scurlock 2002a:392	*			
Shackelford *et al.* 2013:4177	*	*		
Shai *et al.* 2016:6	*	*		
Sharlach 2004:14				*
Stone 1997:24				*
Vila 1998:149	*			
Vila 2006	p103/108	p103/108	p108	

OXEN AND DONKEYS FOR MEAT – ANCIENT NEAR EAST	**Evidence that domesticated donkeys in ANE not habitually eaten**	**Donkeys disposed of whole/ without butchery marks**	**Donkeys mentioned in 3rd m BC texts as being fed to dogs *(L = or lions)***	**References to Drehem 3rd-m BC admin centre**
Wapnish 1997:343		*		
Zarins 2014			p202/251 L	p245
Zeder 1986:404-6		*		
Zeder 1994	p181	p181	p179/181	p175/178-9

(i) (with the exception of evidence at Khirbet al-Batrawy)

(ii) (though possible evidence that eaten at Arjoune)

OXEN AND DONKEYS FOR MEAT – MODERN AFRICA etc	**Oxen sold for meat (so increase in value), donkeys rarely so (i)**	**Some eating of donkeys in Africa etc … *G: only ctn groups, I = increasing***	**Donkey meat not liked; used smoked/ in salami**	**Donkeys mainly not eaten**	**Donkey hides sometimes valuable**	**Donkey hides not widely used in Africa**	**Donkey-meat eaten in parts of China**
Aganga *et al.* (Aganga, Patrick &c) 2000:262	*	* I					
Ahmadu *et al.* 2000:266	*						
Audiot and Garnier 1995:66		*	*		*		
Barrett *et al.* 1982:91	*						
Blench 2000:342		*					
Blench 2004		p24		p22-4			

OXEN AND DONKEYS FOR MEAT – MODERN AFRICA etc	**Oxen sold for meat (so increase in value), donkeys rarely so (i)**	**Some eating of donkeys in Africa etc … *G: only ctn groups, I = increasing***	**Donkey meat not liked; used smoked/ in salami**	**Donkeys mainly not eaten**	**Donkey hides sometimes valuable**	**Donkey hides not widely used in Africa**	**Donkey-meat eaten in parts of China**
Blench *et al.* 2004:213-7				*			
Bradbury 2010:7	*						
Brodie 2008:303	*						
Brooke 1999:99		* G					
Canacoo 2004:223		*		*			
Catley and Blakeway 2004:88						*	
William Clarence-Smith pers. comm. 2016		* G			*		*
Cochin 1995:57	*						
Crane 2011:1				*			
Denis 1995:40		*			*		
Epstein 1984:178		*					
Fielding 1987		p25 I		p25-7 (iv)			
Fielding and Krause 1998:11		* G	*		*		
Gebreab 1992:105	*	* G					
Haufiku *et al.* 2004:178		*					
Inns 1980:6	*						
Jacobs 2001:489		*		*			
JG Burkina Faso 2013	*	* G					
Jones 2008a:6			*	*			

OXEN AND DONKEYS FOR MEAT – MODERN AFRICA etc	**Oxen sold for meat (so increase in value), donkeys rarely so (i)**	**Some eating of donkeys in Africa etc … *G: only ctn groups, I = increasing***	**Donkey meat not liked; used smoked/ in salami**	**Donkeys mainly not eaten**	**Donkey hides sometimes valuable**	**Donkey hides not widely used in Africa**	**Donkey-meat eaten in parts of China**
Joubert and Kotsokoane 2000:12	*						
Kreike 2010:100		*					
Kumwenda and Mayeyo 1991:29/30	*			*			
Landais and Lhoste 1990:220-22	*						
Lawrence and Pearson 2002:99-101	*						
Madama *et al.* 2008:10	*						
Marshall 2007:374-5				* (iv)			
Marshall and Weissbrod 2009:71		* G					
Mpande 1994:152				*			
Mwenya and Keib 2004:174	*	*	*				
Nicolaisen 1963		p108/484 G		p107		p107	
Panin and Ellis-Jones 1994:9		* G					
Patrick *et al.* 2000:261		* G					
Schmitz *et al.* 1991:80	*						
Shai *et al.* 2016:6		*					
Simoons 1960:147						*	

OXEN AND DONKEYS FOR MEAT – MODERN AFRICA etc	**Oxen sold for meat (so increase in value), donkeys rarely so (i)**	**Some eating of donkeys in Africa etc … *G: only ctn groups, I = increasing***	**Donkey meat not liked; used smoked/ in salami**	**Donkeys mainly not eaten**	**Donkey hides sometimes valuable**	**Donkey hides not widely used in Africa**	**Donkey-meat eaten in parts of China**
Smith and Pearson 2005:1				*			
Starkey 1987:37/40	*	* G		*			
Starkey 1994b:3				*			
Starkey 2011:17/25	*						
Swai and Bwanga 2008:i	*			*			
Tibbs 1989	p50 (ii)						p45
Tiffen 1976:128	*						
Twerda *et al.* 1997:48-52		* G		*			
Uzureau 1974:112-3	*						
Vall *et al.* 2002b:125	*						
Wambui *et al.* 2004:28	*			*			
Yilmaz 2012		p53 G					p61
Yusuf *et al.* 2016		¶1-2 G			¶4/8/11-12/14 (iii)		¶11

(i) Sims *et al.* (2002:2) report an exception in the Andean hill region in Bolivia where the altitude, aridity, cold, and fodder shortages lead to working oxen losing meat value. Matthewman (1987:219) points out that working oxen are kept long after the optimum slaughter weight

(ii) Tibbs 1989:50 ‘The development of a market for meat can go a long way to assist the adoption of draft animals.‘

(iii) Yusuf *et al.* 2016:¶4/8/11-12/14 Donkey-hides valued in China for processing into food, medicine and cosmetics

(iv) Eaten only in emergencies

DONKEY REMAINS RARELY FOUND IN SETTLEMENTS	Donkey remains rarely found in settlement refuse dumps	Dead donkeys dragged outside settlements/ camps, left on route-side	Aged donkeys left in bush/ desert to die
Brodie 2008:304	*		
Cable and French 1950:160		*	
Dercksen 2004:261-4		*	
Fedele 2014:185	*		
Fielding 1987:27			*
Kalawoun 2016			*
MacDonald 2000:11	*	*	
Marshall and Weissbrod 2009:72		*	
Pearson *et al.* 2001:52			*
Philip 2001:188	*		
Postgate 1986:203	*		
Ramos Soldado 2016:40		*	
Sasson 2010:2	*	*	
Shackelford *et al.* 2013:4177	*		
Shai *et al.* 2016:6	*		
Waithanji 2009:36			*
Zarins 2014:69/ 82	*		

II.13 Advantages of donkeys compared with oxen (III)

ADVANTAGES OF DONKEYS COMPARED WITH OXEN (III.a)	More physiolog-ically energy-efficient (i)	Can pull a larger % of liveweight (ii)	(Weaker than oxen in absolute terms, as smaller) (ii)	Refs to draught force and output factors	Refs to hours of ploughing work	Refs to daily coverage when ploughing	Donkeys good for 2ndary tillage, light agric ops
Barrett *et al.* 1982:25			*	*			
Bartholomew *et al.* 1994:62			*	*			
Behera *et al.* 2008:29				*			
Betker and Kutzbach 1991:226		*					
Blench 1997:24/52			*				
Burford 1960:9						*	
Cochin 1995:58	*						
Dennis and Smith 1995:118	*	*		*			
de Wilde 1967:106			*	*			
Dijkman 1992:153-5	*						
Ebenezer 1991	p224/243	p224/243	p243	p243			
Fielding and Krause 1998:13			*				
Forbes 1955:83			*	*			
Hagmann and Prasad 1995				p231/237	p237	p231/ 236-7	
Halstead 1995:13						*	

ADVANTAGES OF DONKEYS COMPARED WITH OXEN (III.a)	More physiolog-ically energy-efficient (i)	Can pull a larger % of liveweight (ii)	(Weaker than oxen in absolute terms, as smaller) (ii)	Refs to draught force and output factors	Refs to hours of ploughing work	Refs to daily coverage when ploughing	Donkeys good for 2ndary tillage, light agric ops
Hanjra and Lateef 1993:128		* (iii)					
Inns 1980:6					*		
Jones 2008a:13	*			*			
Kerman 1985:17	*	*		*			
Kjaerby 1983:159			*	*			
Köpp 2013:110				*			
Löwe 1986:20	*		*	*			
McCown *et al.* 1979:308			*	*			
Marshall 2007:374	*						
Marshall and Weissbrod 2009:60	*						
Mongomongo and Gembe 2000:185						*	
Mpande 1994:152			*	*	*		
Nengomasha *et al.* 2000:24	*		*	*	*		
Palmer 1998:142			*	*			
Panin and Ellis-Jones 1994:95					*		
Patrick *et al.* 2000:258	*	*					
Pearson and Vall 1998:311	*	*	*	*			
Prasad *et al.* 1991:236-7	*	*	*	*	*		
Renger 1990:272					*		
Sevda *et al.* 2008:21				*			

ADVANTAGES OF DONKEYS COMPARED WITH OXEN (III.a)	More physiolog-ically energy-efficient (i)	Can pull a larger % of liveweight (ii)	(Weaker than oxen in absolute terms, as smaller) (ii)	Refs to draught force and output factors	Refs to hours of ploughing work	Refs to daily coverage when ploughing	Donkeys good for 2ndary tillage, light agric ops
Shai *et al.* 2016:16		*					
Sims and O'Neill 2003:41	*	*	*				
Smith and Pearson 2005:1	*						
Starkey 1981b:24				*	*	*	
Starkey 1987:39							*
Starkey 1997:193				*			
Starkey 2000a:490			*				
Tisserand and Pearson 2003:64-5	*						
Urga and Abayneh 2007:4							*
Viebig 1982	p138/143	p138/143		p138/143	p138		
Westneat *et al.* 1988:335						*	
Wilson 1981:143-4	*	*		*			
Yilmaz 2012:35-7/49	*	*		*			
Yousef *et al.* 1972:339	*						
Zarins 2014:190							*

(i) Hagmann and Prasad (1995:231) found no significant difference in draught force, but the donkeys in the tests wore unsuitable harness

(ii) See APP II.28 for donkey weights

(iii) 'Small animals have relatively better draught efficiency because their line of pull is lower' (Hanjra and Lateef 1993:128)

ADVANTAGES OF DONKEYS COMPARED WITH OXEN (III.b)	Farmers switch from oxen to donkeys	Use of donkeys increasing in some African regions
Cochin 1995:56	* (iv)	
Daborn 2011:¶2		*
Jones [P.A.] 2009:1-2		*
Mitchell 2017:25		*
Ochieng 2011:¶2		*
Starkey 1992:21	* (iv)	*
Starkey 1994b:1	* (iv)	
Starkey 2000a:490	* (iv)	
Starkey 2011:12/36	* (iv)	
Vall and Lhoste 2003:17	*	
Vall *et al.* 2002b:120	*	
Vilà *et al.* 2006:348		*

(iv) Similarly, donkey use spread southward through word of mouth in regions of Africa

II.14 Donkey grazing and herding factors

DONKEY GRAZING AND HERDING FACTORS	Subsist on low-grade feed so cheap to maintain	Have a flexible foraging strategy	Graze more slowly than cattle, and at night	Can be left unguarded to scavenge or graze freely	Recruited ad hoc/ seasonally for work (i) … *MP: by mobile pastoralists*	Grazed communally/ on communal land	Sometimes corralled in modern times	Donkeys sometimes just hobbled
Admassu and Shiferaw 2011:33/42				*				
Aganga *et al.* (Aganga, Letso &c) 2000	* (iv)	§1						
Andrianaivoarivony and Starkey 2003:2							*	
Barrett *et al.* 1982	p25			p37 (ii)			p37	
Stephen Blakeway pers. comm. 2017					* MP			
Blench 2004:24					*			
Blench *et al.* 2004				p213	p213	p213	p213	p11
Brodie 2008:301	*							
Bwalya 2004:131				*				
Cochin 1995	p60				p57			
Coppock *et al.* 1986		p576 (iii)		p575				
de Wilde 1967:106	*							
Epstein 1984	p174 (iv)				p175 MP			
Fielding 1987:29		*						
Floor 2003:543								*
Förster *et al.* 2013:195/202	* (iii) (iv)							

DONKEY GRAZING AND HERDING FACTORS	Subsist on low-grade feed so cheap to maintain	Have a flexible foraging strategy	Graze more slowly than cattle, and at night	Can be left unguarded to scavenge or graze freely	Recruited ad hoc/ seasonally for work (i) … *MP: by mobile pastoralists*	Grazed communally/ on communal land	Sometimes corralled in modern times	Donkeys sometimes just hobbled
Gebreab 1992:106				*				
Gebreab 1998:16				*		*		
Gebre Wold *et al.* 2004:80	*	*						
Groves 1974			p110		p159			
Halstead and Isaakidou 2011:62	*							
Hassan and Ibitoye 1993:14							*	
Isager and Skydsgaard 1992:107					*			
Jacobs 2001	p498-9	p499						
Janis 1976:761-3	*							
Johnson 1969:141					* MP			
Jones 2000b:237							*	
Jones 2008a:12-13	*							
Jones 2008b		p49		p50	p50			
Jones [P.A.] 2009:2-3	*							
Kimura *et al.* 2010:6					* MP			
Kreike 2010	p100	p100 (iii)	p100	p99	p99			p98
Little *et al.* 1999		p55 (iii)		p56				
McLean *et al.* 2010:20	*							
Marshall 2007:379			*					
Marshall and Weissbrod 2009				p70/73	p70	p70	p70/73	

DONKEY GRAZING AND HERDING FACTORS	**Subsist on low-grade feed so cheap to maintain**	**Have a flexible foraging strategy**	**Graze more slowly than cattle, and at night**	**Can be left unguarded to scavenge or graze freely**	**Recruited ad hoc/ seasonally for work (i) … *MP: by mobile pastoralists***	**Grazed communally/ on communal land**	**Sometimes corralled in modern times**	**Donkeys sometimes just hobbled**
Marshall *et al.* 2014:6154					* MP			
Mpande 1994:152/154	*							
Mudamburi *et al.* 2003			p24	p26	p26		p26	
Mueller and Houpt 1991:87	*							
Nicolaisen 1963					p106 MP			p106
Oakenfull *et al.* 2000:353		*						
Owiti and Abdalla 2010:88	* (iv)							
Pearson *et al.* 2001	p22/31			p45			p45	
Pearson *et al.* 2003:26								*
Ramachandran and Srinivas 1991:20	*							
Raziq *et al.* 2010:112	* (iv)							
Shackelford *et al.* 2013:4171				*		*		
Shai *et al.* 2016:16	*							
Smith and Pearson 2005	p1/7/12/14	p1	p12				p15	
Smith and Wood 2008:11	*	*						
Sosovele 2004:109	*							
Starkey 1987:40				*				
Starkey 2011:17	*							
Swai and Bwanga 2008:ii	*	* (iii)						
Twerda *et al.* 1997:50				*			*	
Valette 2014:22	*							

DONKEY GRAZING AND HERDING FACTORS	Subsist on low-grade feed so cheap to maintain	Have a flexible foraging strategy	Graze more slowly than cattle, and at night	Can be left unguarded to scavenge or graze freely	Recruited ad hoc/ seasonally for work (i) … *MP: by mobile pastoralists*	Grazed communally/ on communal land	Sometimes corralled in modern times	Donkeys sometimes just hobbled
Wells and Krecek 1997:49				*	*		*	
Wells and Krecek 2001:40				*			*	
Wells *et al.* 2004:207				*			*	
Yilmaz 2012:69	* (iii)							
Zarins 2014:13-14					* MP			

(i) Seasonal corralling/ rounding-up of other working animals:
Aikio 1989:169 (reindeer)
Blench 2004:24 (reindeer)
Ingold 1980:94-99/203 (reindeer)
Gauthier-Pilters and Dagg 1981:78 (camels)
Sundkvist 2004 (horses)
Zimmermann 1999:309-10 (horses)

(ii) Barrett *et al.* (1982:37) report, though, on the dangers of leaving donkeys unherded in the bush

(iii) Donkeys are more ready than cattle to browse on woody species

(iv) Accounts of donkeys surviving on bark, fish bones, kitchen waste, paper and equid/ camel manure

II.15 Donkey breeding and supply

MODERN DONKEY BREEDING AND SUPPLY	Donkeys traded between countries	Donkeys bred in one region and sent to another	Modern donkey markets	Mainly male donkeys supplied
Stephen Blakeway pers. comm. 2017		*		*
Blench 2000:342		*		
Blench 2004:24		*		*
Blench *et al.* 2004		p211/216-7	p216-7	p215
Cochin 1995:57-62		*		
Crane 2011:§2			*	
Dercksen 2004:259				*
Edwards 1983:121-30				*
JG Burkina Faso 2013		*	*	
JG Ethiopia 2014		*	*	*
Jones [P.A.] 2009:1-2	*			
Mwenya and Chisembele 2004:144-6	*			
Pearson *et al.* 2001		p64	p64	p19/65
Raziq *et al.* 2010:112			*	
Raziq 2011			*	
Starkey 1987:39	*			
Starkey 1994b:3		*		
Yilmaz 2012:19				*
Zenebe and Fekade 2004:71			*	

REGIONAL LIVESTOCK AND TRADING MARKETS	Used by mobile pastoralists in antiquity	In modern times, for analogy
Crawford 1978:131		*
Ferdinand 1962:141-57		*
Hesse and Wapnish 2002:457	*	
Hole 1968	p257	p256-7

DESIRED ATTRIBUTES OF MODERN SPECIALIST DONKEY (AND MULE) BREEDS		Size	Colour	Strength	Hardiness	Other	Different-iation by region of origin
Admiralty War Staff 1916:139	*Iraq*	*	*	*			*
Alkhateeb 2008:210-11	*Mamluk culture*	*	*	*			*
Binger 1892:489-91	*West Africa*	*	*		*	Docility	*
Blench *et al.* 2004:211	*Nigeria*		*	*	*		
Epstein 1984:176-7	*Modern Near East*	*	*	*		Speed	*
Fielding 1987:27	*Africa*	*					
Gebre Wold *et al.* 2004:78	*Ethiopia*	*	*				*
Gebreab 1992:103	*Ethiopia*	*					*
Jest and Ravis-Giordani 1985:15	*Tibet*				*		
Jones [P.A.] 2009:3	*Africa*			*	*		
Margueron 1989:122	*Modern Near East*			*			

DESIRED ATTRIBUTES OF MODERN SPECIALIST DONKEY (AND MULE) BREEDS		Size	Colour	Strength	Hardiness	Other	Different-iation by region of origin
Marshall *et al.* 2014:6154	*Africa*	*		*	*		
Pearson *et al.* 2001 (i)	*Ethiopia*	p50	p50	p65		Age	
Raziq *et al.* 2010:112	*Baluchistan*	*	*	*	*	Docility	*
Shackelford *et al.* 2013:4171	*Africa*	*		*	*		
Wilson 1978:183-8	*NE Africa*	*	*	*		Speed	*
Wilson 1981:140	*Africa*	*	*				

(i) Pearson *et al.* 2001: Ethiopian donkey dealers set their price on age, condition and sometimes size and sex (p65), but the buyers of donkeys select on size and colour and perhaps age and sex (p50)

KANEŠ TEXTS: CARAVAN DONKEY SUPPLY	High loss rate	Donkey market at Šinahuttum in eastern Anatolia	Paddocks/ gigamlum/ breeding areas near Aššur and en route	One-way process in which most donkeys sold in Anatolia	Donkeys exchanged along with goods	References to black donkeys
Barjamovic 2011		p288	p43		p16-17/53/88/153/163/266/360	p16-17/88/153/163/266/360
Dercksen 1996:61				*		
Dercksen 2004	p259-63		p259			p258
Holladay 2001	p186			p184		
Larsen 1967				p81-4		p29/81
Larsen 2015:172/185						*
Lewy 1958:101					*	*
Kaptan 1981:108					*	*

KANEŠ TEXTS: CARAVAN DONKEY SUPPLY	High loss rate	Donkey market at Šinahuttum in eastern Anatolia	Paddocks/ gigamlum/ breeding areas near Aššur and en route	One-way process in which most donkeys sold in Anatolia	Donkeys exchanged along with goods	References to black donkeys
Michel 2004:191				*		
Summers 1992:183		*				
Veenhof 1972	p1		p2			p1

BREEDING AND SUPPLY OF CARAVAN CAMELS	Breeding and supply	Camels raised/ traded by nomads and particular groups
Bulliet 1975:109/218-9/263	* *(Arabia)*	
Dahl and Hjort 1984:155		*
Grant 1937:143	* *(Near East)*	
Kohler-Rollefson 1993	p186-7 *(India, Arabia)*	*
Meerpohl 2007:138/141	p138 *(northern Africa)*	p138
Nicolaisen 1963:201/215	* *(northern Africa)*	
Raziq 2011	* *(Pakistan)*	
Retso 1991:208	* *(Arabia)*	
Sweet 1971:207	p207 *(Arabia)*	p144
Wapnish 1984:177	* *(Middle East)*	

II.16 Training of working animals and their users

TRAINING OF WORKING ANIMALS	Importance of training	Training to work in pairs/ teams (i)	Length of cattle-training in Africa
Akou 1994:134/331	*		
Barrett *et al.* 1982:6/ 43/ 103/ 109	*		
Blench 1997	p30		p51
Collins 1983:88		*	
Hagmann and Prasad 1995:231	*		
Haufiku *et al.* 2004:179	*		
Isaakidou 2008:105		*	
Jaeger and Matlon 1990:39		*	
JG Burkina Faso 2013			*
JG Ethiopia 2014	*		
Johannsen 2011:16-17		*	*
Lawrence and Pearson 2002:104	*		
Makwanda *et al.* 2000:174			*
Mongomongo and Gembe 2000:183/4	*		
Mulanda *et al.* 2000:203-6			*
Munzinger 1982:45	*		
Orev 1972:236	*		
Otchere *et al.* 1988:236			*
Patrick *et al.* 2000:259		*	

TRAINING OF WORKING ANIMALS	Importance of training	Training to work in pairs/ teams (i)	Length of cattle-training in Africa
Pearson and Smith 1994:123	*		
Pearson *et al.* 2001:30	*		
Pétrequin *et al.* (Pétrequin, Pétrequin and Bailly) 2006:362		*	
Pingali *et al.* 1987:34	*		
Reh 1982	p84	p86	p84
Renger 1990:274	*		
Schmitz *et al.* 1991:79	*		
Sosovele 1994:318-9			*
Spencer 1998:95	*		
Spiess 1994:§2			*
Starkey 1981b:22			*
Starkey 1994a:76	*		
Starkey 1994c:308	*		
Starkey and Apetofia 1986:16	*		
Tibbs 1989:12	*		
Tiffen 1976:128	*		*
Watts 1999:17		*	

(i) Also training farmers accustomed to working with a pair of ploughing animals to reduce to a single one (Astatke and Mohammed-Saleem 1994:304-5)

TRAINING OF WORKING-ANIMAL USERS	Training in implement-making needed	Training of users important	Training re crop strategy, schedule	Product-ivity incrses with user exper'ce	Low adoption if users not trained	Problem if unaccust-omed to cattle/ donkeys	Farmer-to-farmer training key	Arriving/ return'g migrants bring knowl.
Akou 1994:134/331		*			*			
Anderson and Dennis 1994		p303			p303	p383		
Astatke and Mohammed-Saleem 1994:304-5		*						
Barrett *et al.* 1982:6/43/103/109		*	*	*				
Blench 1997		p30				p30		
de Wilde 1967	p107/112	p111				p111		
Delgado and McIntire 1982:190		*	*	*				
Farnham 1997:9-10/ 19/ 100/ 120/ 142/ 144		*			p100		*	
Hailu 1990:99		*			*			
Halstead and Isaakidou 2011:62		*		*				
Haufiku *et al.* 2004:179		*			*			
Jaeger and Matlon 1990		*	*	p40-41/46	*			
JG Burkina Faso 2013		*			*		*	*
JG Ethiopia 2014	*		*	*		*	*	*
Jolly and Gadbois 1992:464/5		*			*			
Jones 2008b:50		*		*		*		
Kjaerby 1983:46		*					*	
Kruit 1994:475		*			*		*	

TRAINING OF WORKING-ANIMAL USERS	Training in implement-making needed	Training of users important	Training re crop strategy, schedule	Product-ivity incrses with user exper'ce	Low adoption if users not trained	Problem if unaccust-omed to cattle/ donkeys	Farmer-to-farmer training key	Arriving/ return'g migrants bring knowl.
Laurent 1968:255		*			*	*		
Lekezime 1988:351		*			*			
Lombe *et al.* 1994:285						*		
Lubumbe 1994:366		*			*	*	*	
Makwanda *et al.* 2000:174		*					*	
Mwenya *et al.* 1994:469		*				*		
Ngamau 1999:80		*			*			
Panin 1988		p158	p158	p158/162				
Pearson and Smith 1994:123		*				*		
Pearson *et al.* 2001:30		*		*	*		*	
Pingali *et al.* 1987:10		*						
Reh 1982		p84				p77		
Sosovele 1994:318-9		*					*	*
Starkey 1981a:15		*						
Starkey 1992:21							*	
Starkey 1994a:78		*					*	*
Starkey 1994b:1							*	
Starkey 1994c		p307			p308		p307	
Tibbs 1989:12		*		*	*		*	
Tiffen 1976:131	*	*			*			
Vall *et al.* 2002b:120		*	*					
Wood and Milimo 1994:344-5								*

IMPLICATIONS OF TRAINING ANIMALS	Trained animals easier to steal	Animals need isolation/ human contact/ regular use to retain training (ii)
Anderson and Dennis 1994:381		*
de Wilde 1967:112		*
Jones 2008b:50		*
Reh 1982:77/84/108		*
Schmitz *et al.* 1991	p80	p79
Starkey 1987:40	*	
Starkey 1988:107	*	
Waithanji 2009:19		*

(ii) See APP II.31 on year-round utilisation

II.17 Lifecycle of working animals

LIFECYCLE OF WORKING DONKEYS	Donkey longer lifespan… *W: /working life*	Donkeys breed more slowly than cattle	Donkey oestrus seasonal, doesn't show	Donkeys can carry loads from 2½-3 years	Incidence of castration of donkeys varies culturally	Advantages of donkey castration anecdotal	Castrate donkeys re behaviour, straying
Aganga and Seabo 2004:156	* W						
Aganga *et al.* (Aganga, Patrick &c) 2000:265							*
Ayo-Odongo *et al.* 2000:212		*					
Blench 2000:343			*				
Borwick 1981:156			*				
Brodie 2008:303	* W	*					
Canacoo 2004					*		
Denis 1995	p41 W		p35	p39			p39
Dennis 1999:153	* W						
Dercksen 2004:260	*			*			
Fielding and Krause 1998:13	* W						
Förster *et al.* 2013:195	*						
Gebreab 1992:105	*						
Gebreab 1998:16	*						
Hassan and Ibitoye 1993:140				*			

LIFECYCLE OF WORKING DONKEYS	**Donkey longer lifespan… *W: /working life***	**Donkeys breed more slowly than cattle**	**Donkey oestrus seasonal, doesn't show**	**Donkeys can carry loads from 2½-3 years**	**Incidence of castration of donkeys varies culturally**	**Advantages of donkey castration anecdotal**	**Castrate donkeys re behaviour, straying**
Isager and Skydsgaard 1992:87	*		*				
Jones 2000b	p237 W	p238					
Jones 2008a:12	* W						
Jones 2011	* W						
Joubert and Kotsokoane 2000:12	* W						
Kaumbutho 2003:11	* W						
Kaumbutho *et al.* 2004:98	* W						
McShane and Tarr 2007:370						*	
Marshall and Asa 2013:490							*
Marshall and Weissbrod 2009:73		*	*				
Marshall and Weissbrod 2011:S406					*		
Marshall *et al.* 2014:6154							*
Mohammed 1991:185	*	*					
Mpande 1994:152	* W	*					
Mudamburi *et al.* 2003:27					*	*	
Muvirimi and Ellis-Jones 1999:14	* W						
Nicolaisen 1963:110					*		*

LIFECYCLE OF WORKING DONKEYS	**Donkey longer lifespan… *W: /working life***	**Donkeys breed more slowly than cattle**	**Donkey oestrus seasonal, doesn't show**	**Donkeys can carry loads from 2½-3 years**	**Incidence of castration of donkeys varies culturally**	**Advantages of donkey castration anecdotal**	**Castrate donkeys re behaviour, straying**
Osborn and Osbornová 1998:136	*						
Pearson *et al.* 2001	p43 W	p50					
Schreiber and Zimmermann 2002:134			*				
Singh *et al.* 2007:1018					*		
Sims and Maldonado 1991:12	* W						
Starkey 2011:17	*						
Starkey and Mutagubya 1992:26						*	*
Starkey *et al.* (Starkey, Hanekom &c) 2000:86	* W						
Starkey *et al.* (Starkey, Jaiyesimi-Njobe &c) 2000:23	*						
Yilmaz 2012:19	*						
Zarins 2014:256				*			

LIFECYCLE OF WORKING OXEN	Ox training age & work years	Fast-track lifecycle for beef oxen	Working bulls not always castrated	Bulls castrated earlier for meat, later for work	Cattle age/ sex profiling for work detection
Aganga and Seabo 2004:156	*	*			
Barker 1999:275				*	
Barrett *et al.* 1982:36	*				
Bartosiewicz *et al.* 1997:95		*		*	
Blench 1997:15	*		*		
Fielding 1987:23		*			
Fielding and Krause 1998:34		*			
Halstead 2014:16	*				
Hanjra and Lateef 1993:129	*				
Heimpel 1995:108			*		
Isaakidou 2008:105	*				
Isager and Skydsgaard 1992:89	*				
Johannsen 2005:47					*
Johannsen 2011	p16		p16	p16	p13-14
Jones 1997:70				*	
Joubert 1995:129	*				
Lindblom 1931:24			*		
Maekawa 1979a:108			*		
Otchere *et al.* 1988:236	*		*		
Reh 1982:78				*	
Renger 1990:271	*				
Sherratt 2006:336			*		

LIFECYCLE OF WORKING OXEN	Ox training age & work years	Fast-track lifecycle for beef oxen	Working bulls not always castrated	Bulls castrated earlier for meat, later for work	Cattle age/ sex profiling for work detection
Starkey 1981a:9			*	*	
Starkey 1981b:22	*				
Starkey 1991:78			*		
Starkey 1993:3			*		
Starkey 2011:11			*		
Starkey and Apetofia 1986:10			*		
Starkey and Mutagubya 1992:26				* (i)	
Stol 1995:184	*				
Thomas 2013:1					*
Tiffen 1976:130		*			
Urga and Abayneh 2007:3	*				
Uzureau 1974:112		*			
Zarins 2014:42					*
Zeder 1991:29				*	

(i) Though the anticipated greater draught strength from later castration is doubted by experts

II.18 Carts and wagons

EARLY CARTS AND WAGONS (I)	Donkey-vehicles 3rd/4th m – elite	Wheeled vehicles late 4th m	Uruk IV picto-graphs	Dubious early evidence	Early wagons elite/ expensive	Patchy 3rd-m evidence	S vs N Mesop-otamia	Vehicles uncompet vs boats/ pack in Mesop
Algaze 2001b:83					*			
Algaze 2008	p145	p145						p51-3
Anthony 2007:66			*	*				
Astour 1995	p1402						p1402-3	p1402 (i)
Bairoch 1988:60								*
Bakker *et al.* 1999		p778-88	p778-82	p778-87	p778-82			
Bondár 2006		p235			p233			
Brodie 2008:301								*
Bulliet 1975:15					*			
Bulliet 2005:172-3		*						
Butterlin and Margueron 2006	p327	p324-5		p317-9			p325-7 (i)	
Charpin *et al.* 1988:392							* (i)	
Childe 1951	p178	p178-93	p178/ 194	p183-4		p178		
Clutton-Brock 1992:68			*					
Clutton-Brock 2012:28			*	*				
Dercksen 1996:64-7								*
Drenth and Lanting 1997		p53-68	p68	p68				
Grigson 1987:229			*					
Grigson 1993:653	*		*					

EARLY CARTS AND WAGONS (I)	Donkey-vehicles 3rd/4th m – elite	Wheeled vehicles late 4th m	Uruk IV picto-graphs	Dubious early evidence	Early wagons elite/ expensive	Patchy 3rd-m evidence	S vs N Mesop-otamia	Vehicles uncompet vs boats/ pack in Mesop
Grigson 1995:258/267			*					
Huot 2014:63								*
Jans and Bretschneider 1998	p156-64		p156		p162			
Kelekna 2009:45		*						
Kohl 2001:232		*						
Littauer [1983] 2002	p9	p14						
Littauer and Crouwel 1979	p23-35	p8/ 23/ 37	p13		p31	p13/ 31/ 37/ 44		
Littauer and Crouwel [1973] 2002	p374-5				p371			
Littauer and Crouwel [1974] 2002:392			*					
Liverani 2006:18		*	*					*
Margueron 1989:123			*					
Matuschik 2006		p279-92			p291			
Milisauskas and Kruk 1991		p562			p565			
Oates 2001					p281	p283	p281	
Pétrequin *et al.* 2006a:17					*			
Pétrequin *et al.* 2006b:277		*						
Pétrequin *et al.* (Pétrequin, Pétrequin and Bailly) 2006:364-6		*						
Piggott 1979:5			*					

EARLY CARTS AND WAGONS (I)	Donkey-vehicles 3rd/4th m – elite	Wheeled vehicles late 4th m	Uruk IV picto-graphs	Dubious early evidence	Early wagons elite/ expensive	Patchy 3rd-m evidence	S vs N Mesop-otamia	Vehicles uncompet vs boats/ pack in Mesop
Piggott 1983		p60	p38					
Ruoff 2006:138		*						
Sallaberger 1998:173-5	*							
Schlichtherle 2006:172-3		*						
Sherratt 1981		p263-6	p263					
Sherratt 1997a:11					*			
Sherratt 2003:243/247/249				*	*			
Sherratt 2006		p349-51	p343					
Vosteen 2006		p244	p242-3		p239-40/ 244			
Zarins 2014	p188/ 193-7	p193		p193		p195		

(i) The 2nd-millennium BC ruler Hammurabi's remark that boats were the strength of South Mesopotamia and donkeys and wagons of the North (Archives Epistolaires de Mari, Boats I/2, no.468 [A.1161])

EARLY CARTS AND WAGONS (II)	Vehicles dep on terrain/ road infra-structure	Wheeled vehs evolving from sledges	Wheeled vehs not from travois
Anthony 2007:66		*	
Astour 1995:1402	*		
Bairoch 1988:12	*		

EARLY CARTS AND WAGONS (II)	Vehicles dep on terrain/ road infra-structure	Wheeled vehs evolving from sledges	Wheeled vehs not from travois
Bakker *et al.* 1999:778		*	
Barrett *et al.* 1982:53	*		
Berg 1935		*	
Brodie 2008:301	*		
Bulliet 1975:226-7	*		
Clark and Haswell 1970:196-201/208	*		
Halstead and Isaakidou 2011:62	*		
Hassig 1986:145	*		
Littauer [1983] 2002		p4	p4-6
Littauer and Crouwel 1979:8-10		*	*
Matuschik 2006:285		*	
Pétrequin *et al.* 2006a:11-19		*	
Pétrequin *et al.* (Pétrequin, Pétrequin and Bailly) 2006:365		*	
Piggott 1983:35		*	
Vosteen 2006:239	*	*	

CARTS AND WAGONS IN RECENT TIMES	Human traction	Cart type and use: historical variations	Cart introduction in Africa	Cart capacity	Harness technology poor
Admassu and Shiferaw 2011:23			*		
Berg 1935:108			*		
Blench 2000:342			*		
Brodie 2008:301				*	
Dennis 1996:3-7				*	
Fernando and Starkey 2004:14		*			
Forbes 1955:82					*
Hanekom 2004:193-4		*	*		
Havard *et al.* 2007:28			*		
Jacomet and Schibler 2006:141	*				
Jones 2008c:18				*	
Köpp 2013:111	* (i)				
Krause 1995:19					*
Kreike 2010:94		*	*		
Kruit 1994:476			*		
Littauer [1983] 2002:10					*
Mutua and Mwangi 2007				p207	p205
Mwanzia 2000:240		*			
Ndayambaje 2008:28				*	
O'Neill 1998:28		*	*		
Sherratt 2006:342	* (i)				
Starkey 1991:84			*		
Starkey 1992:22-3			*		
Starkey 1993:4		* (i)			

CARTS AND WAGONS IN RECENT TIMES	Human traction	Cart type and use: historical variations	Cart introduction in Africa	Cart capacity	Harness technology poor
Starkey 1994a:70			*		
Starkey 1994b:2-3			*		
Starkey and Fernando 1998:§2			*		
Starkey and Mutagubya 1992:28-9	*				
Van Leeuwen and Siyabango 1999:179		* (i)			
Whittle 2003:83	*				
Wilson 1991:43			*		

(i) Sledges

II.19 Breeding and herding of working cattle in sub-Saharan Africa

BREEDING AND HERDING OF WORKING CATTLE IN SUB-SAHARAN AFRICA	Division between crop-farmers and cattle-herders	Working cattle have to be fed/ managed on-farm	Cattle breed better in some regions than others	Working cattle supplied by herders/ traders	Some farmers breed and sell on working cattle	Reasons for keeping working animals corralled	Working cattle sold after the ploughing season
Bangura 1988	p296-7	p297					
Blench 1997:15				*			

BREEDING AND HERDING OF WORKING CATTLE IN SUB-SAHARAN AFRICA	Division between crop-farmers and cattle-herders	Working cattle have to be fed/ managed on-farm	Cattle breed better in some regions than others	Working cattle supplied by herders/ traders	Some farmers breed and sell on working cattle	Reasons for keeping working animals corralled	Working cattle sold after the ploughing season
Bobobee 1999:62				*			
Bonnemaire and Teissier 1976:92-95/104			*				
Delgado and McIntire 1992:190	*	*					
Dijkman *et al.* 2000:138							*
Jest 1976:87			*				
Jolly and Gadbois 1996:455	*	*					
Lawrence and Pearson 2002			p102				p105
McCann 1984:5			*		*		
Marshall and Weissbrod 2009:74						*	
Marshall and Weissbrod 2011:S406						* (i)	
Mudamburi *et al.* 2003:26						* (i)	
Oma 2007b:49						*	
Phiri 1994:144			*				
Ruthenberg 1964:34						*	
Schlichtherle 2006:172-3						*	
Schneider 1979:88						*	
Starkey 1994a:73					*		

BREEDING AND HERDING OF WORKING CATTLE IN SUB-SAHARAN AFRICA	Division between crop-farmers and cattle-herders	Working cattle have to be fed/ managed on-farm	Cattle breed better in some regions than others	Working cattle supplied by herders/ traders	Some farmers breed and sell on working cattle	Reasons for keeping working animals corralled	Working cattle sold after the ploughing season
Swai and Bwanga 2008:iii						* (i)	
Tiffen 1976:130							*
Uzureau 1974:112-3							*
Zimmermann 1999:304/307/312						*	

(i) Donkeys

II.20 Short-distance transport

SHORT-DISTANCE TRANSPORT: HISTORY AND CONTRIBUTORY FACTORS	Short-dist-ance use of donkeys by mod. mobile pastoralists	Long-dist. use of donkeys by modern & anc. mobile pastoralists	Population growth incentive for producing surplus	Plough agriculture allowing the development of cities	Short-distance transport allowing the development of cities	Local transport-ation associated with the wheel	2nd-millenn. BC Egypt donkeys water/ wood-carrying
Abdel-Majid 2008:443		*					
Bairoch 1988				p11-15	p14		

SHORT-DISTANCE TRANSPORT: HISTORY AND CONTRIBUTORY FACTORS	Short-dist-ance use of donkeys by mod. mobile pastoralists	Long-dist. use of donkeys by modern & anc. mobile pastoralists	Population growth incentive for producing surplus	Plough agriculture allowing the development of cities	Short-distance transport allowing the development of cities	Local transport-ation associated with the wheel	2nd-millenn. BC Egypt donkeys water/ wood-carrying
Boserup [1965] 2005:11/41/72			*				
Blench *et al.* 2004:211		*					
Evenari *et al.* 1971:309	*	*					
Fall *et al.* 2002:446			*		*		
Fielding 1987:23					*		
Golden 2002:225-7							
Halstead 1995:19				*			
Hassan 1993:555					*		
Jacobs 1975:408	*	*					
Janssen 2005							*
Janssen *et al.* 2003:26							*
Johnson 1969:141		*					
Kelekna 2009:45						*	
Kelly 2010:110			*				
McDowell 1999:75							*
Marshall 2007	p374	p373-4					
Marshall and Weissbrod 2009	p73	p59-60/67/69/74					
Mitchell 2017:22		*					
Nicolaisen 1963	p109	p106-10					
Philip 2001:201						*	
Pingali *et al.* 1987:4			*				

SHORT-DISTANCE TRANSPORT: HISTORY AND CONTRIBUTORY FACTORS	Short-dist-ance use of donkeys by mod. mobile pastoralists	Long-dist. use of donkeys by modern & anc. mobile pastoralists	Population growth incentive for producing surplus	Plough agriculture allowing the development of cities	Short-distance transport allowing the development of cities	Local transport-ation associated with the wheel	2nd-millenn. BC Egypt donkeys water/ wood-carrying
Shai *et al.* 2016:6					*		
Shenk *et al.* 2010:79			*				
Sherratt 1981:287/295						*	
Sherratt 1983:99			*				
Sherratt 2006:345				*			
Vila 1998:5				*			
Zarins 2014:188						*	

SHORT-DISTANCE TRANSPORT: MODERN USAGE	Urban/ peri-urban donkey use intensive and lucrative	Major issue of fodder provision for urban animals	Issue of urban working-animal dung removal	Urban use of donkeys male, rural use more female	Yehil Berenda market in Addis Ababa donkey transport	Pack-donkeys may be preferred to ox-wagons	Importance of distance from settlement to fields
Admassu and Shiferaw 2011	p27	p10/33 *(Ethiopia)*					p33 (iii)
Aganga and Seabo 2004:156						*	
Ayo-Odongo *et al.* 2000:211							* (ii)
Barker 1983:104		* *(Britain)*	*				

SHORT-DISTANCE TRANSPORT: MODERN USAGE	Urban/ peri-urban donkey use intensive and lucrative	Major issue of fodder provision for urban animals	Issue of urban working-animal dung removal	Urban use of donkeys male, rural use more female	Yehil Berenda market in Addis Ababa donkey transport	Pack-donkeys may be preferred to ox-wagons	Importance of distance from settlement to fields
Barrett *et al.* 1982:106						*	
Brodie 2008:302-3							* (i)
Clark and Haswell 1970:209							* (ii)
Cochin 1995:59	*						
Fall *et al.* 2003:29	*						
Gebreab 1998:16	*				*		
Halstead 1989:77							* (ii) (iv)
Halstead 1990:189							* (i)
Halstead and Jones 1989:48						*	
Hanjra and Lateef 1993:129	*	* *(Pakistan)*					
Hassan 1993:556							* (i)
Hassig 1985:264							* (ii)
Haufiku *et al.* 2004:176							* (iii)
Hering and Greeley 1921		p198 *(USA)*	p569-76				
Isaakidou 2008:104							* (iv)
Jaafar Jotheri pers. comm. 2014				*			
McShane and Tarr 2007:ix		* *(USA)*	*				
Marshall and Starkey 1998:33	*				*		

SHORT-DISTANCE TRANSPORT: MODERN USAGE	Urban/ peri-urban donkey use intensive and lucrative	Major issue of fodder provision for urban animals	Issue of urban working-animal dung removal	Urban use of donkeys male, rural use more female	Yehil Berenda market in Addis Ababa donkey transport	Pack-donkeys may be preferred to ox-wagons	Importance of distance from settlement to fields
Nengomasha *et al.* 2000:22	*						
Oates and Oates 1976:120							* (i)
Ochieng 2011:¶5	*						
Pearson *et al.* 2001	p1/15	p1/22/40/44 *(Ethiopia)*		p26			
Robinson 1977:10							* (i)
Sieber 2004:119							* (ii) (iv)
Starkey 1994a:71					*		
Thompson 1983		p59 *(Britain)*	p62				
Valette 2014	p19/26			p26			
Wambui *et al.* 2004	p24			p27-8			
Zenebe and Fekade 2004		p69 *(Ethiopia)*			p69-70		

Distance of settlement/ farm from fields:
(i) Relating to distance for workers
(ii) Relating to transport of crops
(iii) Relating to feeding of ploughing animals
(iv) Relating to transport of fertiliser

II.21 Donkey domestication; elite burials

DOMESTICATED DONKEYS IN MESOPOTAMIA AND EGYPT	Domestic'd donkeys in Mesopotamia from late 4th m BC	Domestic'd donkeys in Mesopotamia 3rd m BC… *Pl: for ploughing*	Libyan 'Cities palette' 4th m Egypt: donkeys from desert peoples	Domest. donkeys in Egypt: late 4th m BC evidence	IVth-Dynasty owner of more than 760 donkeys	DNA evidence
Algaze 2008:141	*	*				
Aranguren-Mendez *et al.* 2004						*
Baines 2003			*			
Beja-Pereira *et al.* 2004						*
Blench 2000:339/342-4/ 344			* (ii)			
Brewer *et al.* 1994:100					*	
Bruford *et al.* 2003						
Champlot *et al.* 2010						*
Clutton-Brock 2012		p28 Pl	p57			
Epstein 1984:176			*			
Harrison 1993:84			* (ii)			
Hassan 1988:161			* (i) (ii)			
Heimpel 1994:18/22		* Pl				
Heimpel 1995:91-7/134-5		* Pl				
Jansen *et al.* 2002						*
Kimura *et al.* 2010				p2/6 (i)		*
Maekawa 1979a:102/111		* Pl				
Maekawa 1979b:43-4		* Pl				
Marshall 2007:384				* (ii)		

DOMESTICATED DONKEYS IN MESOPOTAMIA AND EGYPT	Domestic'd donkeys in Mesopotamia from late 4th m BC	Domestic'd donkeys in Mesopotamia 3rd m BC… *Pl: for ploughing*	Libyan 'Cities palette' 4th m Egypt: donkeys from desert peoples	Domest. donkeys in Egypt: late 4th m BC evidence	IVth-Dynasty owner of more than 760 donkeys	DNA evidence
Marshall and Weissbrod 2009:60				* (i)		
Marshall and Weissbrod 2011:S398				* (i) (ii)		
Marshall *et al.* 2014						*
Muzzolini 2000:103				* (ii)		
Oakenfull *et al.* 2000						*
Oates 2003:115	*					
Osborn and Osbornová 1998:135			*		*	
Postgate 1986:194/200		* Pl				
Potts 2011		p171 Pl		p168 (ii)		
Potts 2014:643-5	*					
Rossel *et al.* 2008:3715/3719				* (i)		
Sallaberger 2014:350		* Pl				
Shackelford *et al.* 2013:4170/4176-7				* (i)(ii)		
Shai *et al.* 2016:4		* Pl			*	
Sherratt 1997c:209-10				*		
Sherratt 2003:244		* Pl				
Stol 1995:190		* Pl				
Uerpmann 1987:141	*					
Vila 1998:132		* Pl				
Vila 2006:102	*	*				
Vilà *et al.* 2006						*

DOMESTICATED DONKEYS IN MESOPOTAMIA AND EGYPT	Domestic'd donkeys in Mesopotamia from late 4th m BC	Domestic'd donkeys in Mesopotamia 3rd m BC… *Pl: for ploughing*	Libyan 'Cities palette' 4th m Egypt: donkeys from desert peoples	Domest. donkeys in Egypt: late 4th m BC evidence	IVth-Dynasty owner of more than 760 donkeys	DNA evidence
Way 2011		p133/141		p107		
Zarins 2014	p67/70/78/188/250	p71-73/250; p188-190 Pl	p108	p76-77 (i)/ 80 (ii) /108-9		
Zeuner 1963:375			*			

(i) Abydos donkey burials

(ii) Donkey remains at Maadi in the Egyptian delta

DOMESTICATED DONKEYS IN THE SOUTHERN LEVANT. HIGH AND LOW STATUS.	Domest-icated donkeys in S Levant from late 4th m BC	Figurines of laden donkeys in early 3rd m BC in S Levant	Elite draught animals in 3rd m BC ANE	Mari text citing donkey-killing to seal a treaty	Pejorative attitudes to donkeys in antiquity	High-status/ elite donkey burials in 4th- 3rd m BC ANE	Secular prestige of donkeys
Amiran 1985:191-2		*					
Arbuckle 2012a:214			*				
Audiot and Garnier 1995:67					*		
Bar 2014:29	*						
Brewer *et al.* 1994:100					*		
Brewer 2002:447					*		
Bulliet 2005				p150/153	p151-152 (iii)		

DOMESTICATED DONKEYS IN THE SOUTHERN LEVANT. HIGH AND LOW STATUS.	Domest-icated donkeys in S Levant from late 4th m BC	Figurines of laden donkeys in early 3rd m BC in S Levant	Elite draught animals in 3rd m BC ANE	Mari text citing donkey-killing to seal a treaty	Pejorative attitudes to donkeys in antiquity	High-status/ elite donkey burials in 4th- 3rd m BC ANE	Secular prestige of donkeys
Clutton-Brock 1986:210						*	
Clutton-Brock 1989:217-20						*	
Clutton-Brock 2001				p331		p327-38	
Clutton-Brock 2003:126						*	
Clutton-Brock and Davies 1993:209-15						*	
Dolce 2014:57/63						*	
Epstein 1985:59		*					
Greenfield *et al.* 2012		p23		p25/ 42		*	p43-5
Grigson 1987:229		*					
Grigson 2000:17	*						
Halstead and Isaakidou 2011:68-9							*
Hesse and Wapnish 2002:473						*	
Horwitz and Tchernov 1989	p287-290	p287					
Houlihan 2002:35					*		
Laurans 1985					*		
Littauer and Crouwel 2001:331						*	
Littauer and Crouwel [1973] 2002:374-5			*			*	

DOMESTICATED DONKEYS IN THE SOUTHERN LEVANT. HIGH AND LOW STATUS.	**Domest-icated donkeys in S Levant from late 4th m BC**	**Figurines of laden donkeys in early 3rd m BC in S Levant**	**Elite draught animals in 3rd m BC ANE**	**Mari text citing donkey-killing to seal a treaty**	**Pejorative attitudes to donkeys in antiquity**	**High-status/ elite donkey burials in 4th- 3rd m BC ANE**	**Secular prestige of donkeys**
Marshall 2007:384					* (iii)		
Milevski 2011	p179	p15/183-196/230-231				p193	p192/232
Oates and Oates 2001:41-8						*	
Osborn and Osbornová 1998			p135		p136 (iii)		
Ovadia 1992:20-24		*					
Postgate 1986:203-4			*			*	
Power 2004:131-4					*		
Ramos Soldado 2016:36						*	
Ritvo 2006:125							*
Scurlock 2002a:392			*			*	
Shackelford *et al.* 2013:2177			*				*
Shai *et al.* 2016		p5/13-16	p18	p7		p7	p6-7
Sherratt 1983:95	*	*					
Sherratt 1997c:209	*	*					
Silver 2014:335	*					*	
Vila 1998			p148			132-3/148	p132
Vila 2006:101						*	
Vila 2014:433	*					*	

DOMESTICATED DONKEYS IN THE SOUTHERN LEVANT. HIGH AND LOW STATUS.	Domest-icated donkeys in S Levant from late 4th m BC	Figurines of laden donkeys in early 3rd m BC in S Levant	Elite draught animals in 3rd m BC ANE	Mari text citing donkey-killing to seal a treaty	Pejorative attitudes to donkeys in antiquity	High-status/ elite donkey burials in 4th- 3rd m BC ANE	Secular prestige of donkeys
Wapnish 1997			*	p359/364		p335/349-50/359	
Way 2010			*	p214-215		*	
Way 2011			*	p3	p944	*	
Weber 2008			*				
Weber 2012			*	p176			
Zarins 1986			*			*	
Zarins 2014	p111/250	p111					

(iii) Associated in Egypt with the evil god Set

DONKEY ORIGINS	Possible early domestic'n by mobile N Afr cattle-herders	New genetic studies – African origin	Donkeys rarely subject to selective breeding	Active encouragement of breeding with the wild	Ref. to donkey size reduction as domestication indicator
Beja-Pereira *et al.* 2004	p1781	*			
Bökönyi 1985:497					*
Brewer *et al.* 1994:99	*				
Clutton-Brock 1986:210					*
Clutton-Brock 2012:29		*			
Clutton-Brock and Davies 1993:210					*

DONKEY ORIGINS	Possible early domestic'n by mobile N Afr cattle-herders	New genetic studies – African origin	Donkeys rarely subject to selective breeding	Active encouragement of breeding with the wild	Ref. to donkey size reduction as domestication indicator
Dercksen 2004:257					*
Epstein 1984:177				*	
Grigson 1993:645-6					*
Grigson 2003:219					*
Groves 1986:46					*
Hemmer 1990:99					*
Hesse and Wapnish 2002:470					*
Kimura *et al.* 2010	p6	*			
Kuper 2013:11	*				
Marshall 2007:373	*				
Marshall and Asa 2013:481	*				*
Marshall and Weissbrod 2009:59-74	*				
Marshall and Weissbrod 2011			pS407	pS405	pS398
Marshall *et al.* 2014			p6154-5	p6153	
Mwanzia 2000:241				*	
Nicolaisen 1963				*	
Shackelford *et al.* 2013:4171				*	
Uerpmann 1989:164					*
Uerpmann 1991:30					*
Vila 1998:47/75					*
Vila 2014:434					*
Vilà *et al.* 2006	p350	p348-50			

DONKEY ORIGINS	Possible early domestic'n by mobile N Afr cattle-herders	New genetic studies – African origin	Donkeys rarely subject to selective breeding	Active encouragement of breeding with the wild	Ref. to donkey size reduction as domestication indicator
Zarins 2014	p78/109			p16	p45
Zeder 1986:407					*

II.22 Long-distance pack donkey caravans

PACK CARAVANS IN THE ANCIENT NEAR EAST	Increased long-distance exchange in ANE	Mesopotamian commentators: limited reference to donkey caravans	Importance of new transport nodes	Text references to banditry en route (i)	Definitions of Ancient Near Eastern trade
Adams 1974		p247	p247		p240
Algaze 2008			p117		pxvii/15
Beale 1973	p133				p141
Charvát 2002:120		*			
Clark and Haswell 1970:211			*		
Cooper 1992:1-5				*	
Crawford 2013:448					*
Finet 1969:46				*	
Grigson 1995:258	*				
Harrison 1993:88			*		

PACK CARAVANS IN THE ANCIENT NEAR EAST	Increased long-distance exchange in ANE	Mesopotamian commentators: limited reference to donkey caravans	Importance of new transport nodes	Text references to banditry en route (i)	Definitions of Ancient Near Eastern trade
Holladay 2001:139-41					*
Ilan 2002:317			*		
Kohl 2001:231-2					*
Lamberg-Karlovsky 1972:222					*
Lamberg-Karlovsky *et al.* 1996		p86-97			p86-9
Larsen 2015				p156	p188/276-8
Levy 1995:232-4	*				
Liverani 2001:73				*	
Liverani 2005:52-3					*
Marfoe 1987:28			*		
Matthews 1978:101				*	
Matthews and Fazeli 2004		p70			p72
Milevski 2011:7-9					*
Moorey 1994:3-12		*			
Oates 1968:6				*	
Oppenheim 1957:29-33					*
Philip 2001:188	*				
Polanyi 1957b					*
Polanyi 1957a:51/56-68					*
Pollock 1999:43		*			
Postgate 2003:12-19					*
Potts 2011:172	*				

PACK CARAVANS IN THE ANCIENT NEAR EAST	Increased long-distance exchange in ANE	Mesopotamian commentators: limited reference to donkey caravans	Importance of new transport nodes	Text references to banditry en route (i)	Definitions of Ancient Near Eastern trade
Renfrew *et al.* 1966:52	*				
Sherratt 1997a:5					*
Sherratt 2006:353	*				
Stein 1999:46					*
Veenhof 1972:338				*	
Wright 2001:127	*				
Yener 1983:3-5					*
Zeder 1998:59			*		

(i) See also commentary on the Kaneš donkey-caravans

CARAVAN ROUTE PRACTICALITIES	Growth of repackaging/ transshipment centres/ outposts… *N: N Mesop, L: Levant/ Egypt*	Establishment of way-stations & infra-structure (ii)	Route feeder/ branch systems	Route maintenance/ support	Bridges/ ferries
Adams 1974:247	* N		*		
Admiralty War Staff 1916:162					*
Algaze 1995:95	* N				

CARAVAN ROUTE PRACTICALITIES	**Growth of repackaging/ transshipment centres/ outposts… *N: N Mesop, L: Levant/ Egypt***	**Establishment of way-stations & infra-structure (ii)**	**Route feeder/ branch systems**	**Route maintenance/ support**	**Bridges/ ferries**
Algaze 2001a:207	* N				
Algaze 2008:117-8	* N				
Astour 1995:1401				*	
Barjamovic 2011:34-7		*			
Bass 1995:1422					*
Black 2002:43				*	
de Graeve 1981:144-7					*
Förster 2007a		*		*	
Förster 2007b		*			
Gophna 1987:14	* L				
Grant 1937:63				*	
Harrison 1993:88		*			
Hassig 1985		p201	p32/264		
Heimpel 1994		p9			p24-5
Ilan 2002:317	* L				
Lamberg-Karlovsky *et al.* 1996:91	* N				
Larsen 2015	p147 N	p148/175		p157	p177
Marfoe 1987:28		*	*		
Oates 2001:279		*			
Oates 2003:117		*			
Oren 1973:200	* L	*			

CARAVAN ROUTE PRACTICALITIES	**Growth of repackaging/ transshipment centres/ outposts… *N: N Mesop, L: Levant/ Egypt***	**Establishment of way-stations & infra-structure (ii)**	**Route feeder/ branch systems**	**Route maintenance/ support**	**Bridges/ ferries**
Oren 1989		p389		p402	
Robinson 1977:13			*		
Sallaberger 1996:99		*			
Skrivanek 2007:136				*	
Starkey 2011:11			*		
Thareani-Sussely 2007		p123		p125	
Wengrow 2006:39	* L				
Zeder 1998:59	* N				

LONG-DISTANCE TRANSPORT IN THE SOUTHERN LEVANT	**Long-distance transport in the S Levant**	**Egyptian involvement in the S Levant**	**4th millenn. BC Faynan/ Negev/ Beersheva valley donkey transport of copper ore**	**More distant pastoralist burial grounds**
Barker and Mattingly 2007:102-5	*		*	
Barker *et al*. 2007	p232/257		p232	
Ben-Tor 1986:10		*		
Bourke 2001:150		*		

LONG-DISTANCE TRANSPORT IN THE SOUTHERN LEVANT	Long-distance transport in the S Levant	Egyptian involvement in the S Levant	4th millenn. BC Faynan/ Negev/ Beersheva valley donkey transport of copper ore	More distant pastoralist burial grounds
Cribb 1991:13		*		
Finkelstein and Perevolotsky 1992:74			*	
Golden 2002	p227/231		p225-7	
Harrison 1993:84		*		
Ilan and Sebbane 1989	p143-158		p141-58	
Joffe 1991		p4/10/22-6		p38
Levy 1986	p96			p96-8
Levy 1995	p234-5	p234	p234	p235
Mattingly *et al*. 2007:344-5			*	
Oren 1989:401		*		
Rosen 1987:53	*			
Wright et al. 1998:34			*	

CARAVANS TO KANEŠ	Commentators on Aššur-Kaneš trade	Size of Kaneš caravans	Donkey-to-human ratio of Kaneš caravans	Donkeys bought/ rented at start	Donkeys sold at end
Barjamovic 2011	*	p35 (ii)	p35		p16
Brodie 2008	p299		p302		
Cooper 1992:8	*				
Dercksen 1996	*		p61		

CARAVANS TO KANEŠ	Commentators on Aššur-Kaneš trade	Size of Kaneš caravans	Donkey-to-human ratio of Kaneš caravans	Donkeys bought/ rented at start	Donkeys sold at end
Dercksen 2004	*	p283 (ii)	p255/283	p259-63	
Holladay 2001	*	p184-5 (ii)	p184		
Larsen 1967	*		p65		
Larsen 2015	*	p171/173 (ii)	p171/186		
Michel 2004	*				p191
Palmisano 2017	*				
Postgate 2003	*				
Veenhof 1972	*				
Veenhof 1995	*		p864		

(ii) Size of caravans:
Barjamovic 2011:35 – up to 300 donkeys in later period
Dercksen 2004:283 – up to 300 donkeys
Holladay 2001:184-5 – generally small, but the largest recorded was 167 donkey-loads
Larsen 2015:171/173 – up to 300 donkeys in later period, but the largest recorded earlier (probably exceptional) was 34

CONTAINER TYPES FOR PACK DONKEYS	Clues to pack-donkey introduction from changes in shape, volume and material	Donkey pack container types	Loads may be tied directly onto the donkey
Artzy 1994:137-9	*		
Ben-Tor 1986:5	*		
Brodie 2008:299	*		

CONTAINER TYPES FOR PACK DONKEYS	Clues to pack-donkey introduction from changes in shape, volume and material	Donkey pack container types	Loads may be tied directly onto the donkey
Crawford 1973:237		*	
Dennis and Smith 1995		*	
Dercksen 1996:66		*	
Dercksen 2004:270			*
Digard 1982		p139-40	p139
Dijkman and Sims 1997:228			*
Förster *et al.* 2013:211			*
Hamid 2004:84		*	*
Joffe 1991:23	* (iii)		
Kaptan 1981:109		*	
Köpp 2013:110		*	*
Larsen 2015:171		*	
Levy *et al.* 2004:86		*	
Marfoe 1987:27	*		
Milevski 2011:183-93		*	
Mutua and Mwangi 2000:205			*
Nicolaisen 1963:110			*
Parr 1973:172-7	*		
Potts 1997:158	* (iii)		
Scurlock 2002b:383		*	
Starkey 1998d:22			*
Upadhyay 1991:15		*	
Veenhof 1972:45-7		*	

CONTAINER TYPES FOR PACK DONKEYS	Clues to pack-donkey introduction from changes in shape, volume and material	Donkey pack container types	Loads may be tied directly onto the donkey
Wengrow 2006:138	*		

(iii) Clues from greater uniformity

Commentators on the Abu Ballas donkey-caravan trail in Egypt
Förster 2007a Förster 2007b Förster 2013 Köpp 2013 Kuhlmann 2002:125 Kuper 2001 Riemer 2007:134-5 Riemer 2013

Salt caravans in recent Ethiopia providing exchange currency, e.g. for ploughing ox purchase
Abir 1966:3/8 Gebreab 1998:16 McCann 1984:5-10 Pankhurst 1968:241/346-56 Wilson 1981:139 Woldekiros 2014

II.23 Oxen, camels and other animals for pack

Historical accounts of use of cattle for pack	
Pre-mechanisation India – Bangara pack-bullock caravans	Köhler-Rollefson 2016
15th century AD onwards in South Africa	Brodie 2008:304, Joubert 1995:125-6
Late 19th-/ early 20th-century AD sub-Saharan Africa and Egypt	Binger 1892:372/88, Clutton-Brock 2012:113-6, de Planhol 1969:303/306, Izard 1971:222/227, Lindblom 1931, Osborn and Osbornová 1998:136
Late 20th-century AD sub-Saharan Africa	Blench 1997:12, Havard *et al.* 2007:28, Simoons 1960:145, Vall *et al.* 2002b:125
Late 20th-century AD Dominican Republic	Starkey 1994a:68
20th-century AD Iran	Digard 1982:138
Depictions of cattle for pack in ancient Egypt	

de Planhol 1969:306, Köpp 2013:110, Kuper 2013:11, Muzzolini 2000:103

Chalcolithic ram and bovid figurines bearing items
Epstein 1985:53
Grigson 1987:229
Grigson 1995:267
Ovadia 1992:24-27
Russell 2012:228
Sherratt 1983:96
Sherratt 1997c:209

CAMELS	**Domestication dates**	**3rd-m. BC camel depictions in Mesop/ N Levant – probably from hearsay**
Artzy 1994:134-5	*	
Bulliet 1975	p148-50	p43-62
Cantrell 2010	*	*
Compagnoni and Tosi 1978:98-102	*	
Crawford 1973:237	*	
Gauthier-Pilters and Dagg 1981:115-6	*	
Hakker-Orion 1984:207-8	*	

CAMELS	Domestication dates	3rd-m. BC camel depictions in Mesop/ N Levant – probably from hearsay
Helmer 1992:103	*	
Marshall *et al.* 2014:6154	*	
Retso 1991	p197-207	p199
Ripinsky 1985:135	*	
Rosen 2008:124	*	
Russell 1988:59		
Sapir-Hen and Ben-Yosef 2013	*	
Sherratt 2003:211-2/239	*	
Tosi and Curci 2010	*	
Wapnish 1981:101/104-7	*	
Wapnish 1984:174-80	*	
Zeuner 1963:338-366	*	

II.24 Sledges and travois

USE OF SLEDGES AND TRAVOIS	Banned in places for causing erosion	Superstructures/ containers added	Paired up for large loads	Useful for sandy/ dusty areas	Useful for steep slopes
Anderson and Dennis 1994:384	*			*	
Berg 1935		p137/Plate VIII	p137/ Plate XIV		p31/136

USE OF SLEDGES AND TRAVOIS	Banned in places for causing erosion	Superstructures/ containers added	Paired up for large loads	Useful for sandy/ dusty areas	Useful for steep slopes
Ewers 1955:112		*			
Halstead and Isaakidou 2011:62					*
Hanekom 2004:192	*	*			*
Kilemwa 1999:68/70	*				
Köpp 2013:111				*	
Margueron 1989:123				*	
Starkey 1992:22				*	
Starkey 1993:4				*	
Starkey 1994a:74	*				
Starkey and Mutagubya 1992:29	*			*	
Van Leeuwen and Siyabango 1999:179				*	

USED TO HAUL HEAVY/ BULKY MATERIALS (i)	Crops and fodder	Water	Manure	Firewood	Ploughs	Other (ii)
Aganga and Seabo 2004:154		*		*		
Anderson and Dennis 1994		p384			p381	
Berg 1935	p54	Plate X		Plate VI		p31/54/82, Plates XII- XXI
Ewers 1955:108/308						*
Hanekom 2004:192	*	*	*	*		
Isaakidou 2011:103	*		*			

USED TO HAUL HEAVY/ BULKY MATERIALS (i)	Crops and fodder	Water	Manure	Firewood	Ploughs	Other (ii)
Kilemwa 1999:70	*				*	
Köpp 2013:111						*
Rosen 2008:124	*					
Sosovele 1994:319	*	*	*	*		
Starkey 1992:23	*					
Starkey and Mutagubya 1992:5	*	*	*	*	*	
Starkey *et al*. (Starkey, Hanekom &c) 2000:105	*					
Van Leeuwen and Siyabango 1999:179	*					

(i) Weights hauled on ox-drawn sledges:
150-350kg at 2-4km/hr (Anderson and Dennis 1994:384)
250kg, 2-3km/hr, 15 km/day (Brodie 2008:301)
Up to 400kg for 70km (Van Leeuwen and Siyabango 1999:179)
With two oxen, 200-300kg (one donkey, 35-50kg) (Dennis and Smith 1995:118)

(ii) Other items carried:
Ore, timber, beehives, huts, dead bodies, carcasses from hunting (Berg 1935:31/54/82, Plates XII- XXI)
Camp equipment, sick or injured people (Ewers 1955:108/308)
Sarcophagi and quarry stones in Ancient Egypt (Köpp 2013:111)

Sledges used today	
Southern and eastern Africa	Aganga and Seabo 2004:154, Anderson and Dennis 1994:381, Hanekom 2004:192, Nengomasha *et al.* 2000:24, Sosovele 1994:318, Starkey 1992:23, Starkey 1993:4, Starkey 1994a:74, Starkey and Mutagubya 1992:28-9, Starkey *et al.* (Starkey, Hanekom &c) 2000:105, Van Leeuwen and Siyabango 1999:179
Mediterranean region	Halstead and Isaakidou 2011:62, Isaakidou 2008:101 fig.6.4, Isaakidou 2011:103, Pétrequin *et al.* (Pétrequin, Pétrequin, Arbogast &c) 2006:98 fig.12
China, Philippines	Anderson and Dennis 1994:381, Dennis and Smith 1995:32
Scandinavia	Berg 1935
Travois used today	
Tanzania	Kilemwa 1999:70, Kjaerby 1983:15, Starkey and Mutagubya 1992:5
North America (early 20th century AD native American cultures)	Ewers 1955:2010
China, Philippines	Berg 1935:137
Mediterranean region	Halstead and Isaakidou 2011:62

II.25 Threshing

THRESHING	Evidence of early sledge-based threshing	Animal traction pathol-ogies	Microwear on lithics	Cutmarks on chopped straw phytoliths	Chopped straw/ chaff uses	Modern threshing by trampling	Ceremon-ial signific-ance in late 4th millennium	Early texts/ depictions of sledges
Anderson and Inizan 1994:100					*			
Anderson 1998:155-6				*	*			
Anderson 2003				p423	p425			
Anderson 2006	p305 (7th-6th m)		p305	p309-11	p311			
Anderson *et al.* 2006:1560	(4th-3rd m)							
Anthony 2007:66							*	
Ataman 1999	p215		*		p214			p213/ 215
Bakker *et al.* 1999:783								*
Floor 2003:219						*		
Halstead 2014						p70/128/138-9	p175-6	
Halstead and Isaakidou 2001:65	(8th m)	*	*	*				
Halstead and Jones 1989:44/48					*			
Hanjra and Lateef 1993:128						*		
Littauer and Crouwel 1990:15-17								*

THRESHING	Evidence of early sledge-based threshing	Animal traction pathol-ogies	Microwear on lithics	Cutmarks on chopped straw phytoliths	Chopped straw/ chaff uses	Modern threshing by trampling	Ceremon-ial signific-ance in late 4th millennium	Early texts/ depictions of sledges
Liverani 2006:17	*		*					
McCann 1995:63						*		
Sherratt 2003:249	* (late 4th m)		*	*				
Sherratt 2006	p342 (6th m)						p344	
Simoons:1960:79-80						*		
Skakun 2003:390-92	*							
Starkey 2000a:483						*		
Steinkeller 1990:19-23	*						*	*
Whittaker 1999:13					*			
Whittaker 2003:381					*			

II.26 Donkey behaviour

DONKEY BEHAVIOUR	Shifting associations with small groups	Enjoy company of humans and other donkeys	'Freeze' in face of threat or uncertainty	Avoid showing signs of pain	Valuable as guard animals
Borwick 1971:15			*		
Burden and Thiemann 2015	p377	p377	p377	p376/379	p377
Denis 1995:39				*	
Förster *et al.* 2013:195			*		
French 1993:255		*			
Groves 1974:91	*				
Hart 2012			*	*	
Hemmer 1990:86	*				
Jones 2000b:238		*			
Jones 2004:198		*			
Jones [P.A.] 2009:9		*			
Kaumbutho *et al.* 2004:98			*		
Kelekna 2009:14	*				
Klingel 1974:127	*				
Kumwenda 2004:148		*			
McGreevy 2004	p139	p139	p139/322	p30	p139/322
Marshall and Weissbrod 2009:73	*				
Marshall and Weissbrod 2011:S404	*				
Olmos *et al.* 2010:37				*	

DONKEY BEHAVIOUR	Shifting associations with small groups	Enjoy company of humans and other donkeys	'Freeze' in face of threat or uncertainty	Avoid showing signs of pain	Valuable as guard animals
OMAFRA staff 1997					*
Shackelford *et al.* 2013:4171	*				
Starkey 1995			p140		p148
Walton and Feild 1990					*
Yilmaz 2012	p39	p21	p21/33		p21/23/60

II.27 Donkey secondary products: milk and dung

DONKEY MILK	Donkey milk similar to human milk	Mentioned in Ancient Egyptian texts	Donkeys rarely produce excess milk	Little milking of donkeys in Africa	Some milking by African pastoralists etc	Consumption world-wide rare	Medicinal/ magical qualities	Use for cosmetic purposes
Audiot and Garnier 1995:66	* (i)							
Blench 2000:342				*				
Blench 2004:24		*		*	*		*	
Bulliet 2005:150		*						
Denis 1995:40	* (i)							
Epstein 1984:178	*				*			

DONKEY MILK	Donkey milk similar to human milk	Mentioned in Ancient Egyptian texts	Donkeys rarely produce excess milk	Little milking of donkeys in Africa	Some milking by African pastoralists etc	Consumption world-wide rare	Medicinal/ magical qualities	Use for cosmetic purposes
Fielding and Krause 1998:11					*	*		
Forde 1934:453		*						
Jacobs 2001:489							*	
JG Burkina Faso 2013				*				
Johnson 1969:8						*		
Marshall 2007:374					*			
Mpande 1994:152	*							
Nengomasha *et al.* 2000:25					*			
Osborn and Osbornová 1998:136		*						
Patrick *et al.* 2000:261	*		*					
Polidori 2012	*							
Simoons 1960:149				*			*	*
Twerda *et al.* 1997:48,					*			
Waithanji 2009:29					*			
Yilmaz 2012			p35/61			p61		p61
Yusuf *et al.* 2016	¶10						¶9	¶9

(i) Given to human babies in 19th/20th-century AD France

DONKEY DUNG	Collection can be profitable	Fibrous, forms poor fertiliser	Best for fertiliser	Donkeys tend to defecate in designated places	Dung dry and does not quickly disappear
Fielding and Krause 1998:11		*			
Gilbert 2002:18				*	
Halstead 2014:216			*		
Jacobs 2001:489	*				
Karim-Sesay 1999:40	*				
Klingel 1974:127-9				*	
Lawrence and Pearson 2002:103	*				
McShane and Tarr 2006:370	*				
McShane and Tarr 2007:25	*				
Moreno-García and Pimenta 2011:22			*		
Mpande 1994:152		*			
Oma 2007b:49	*				
Sosovele 2004:109		*			
Starkey 1995:146				*	*
Thompson 1983:59	*				
Zenebe and Fekade 2004:71	*				

II.28 Comparative statistical information

Traction speed of donkeys compared with cattle	
Donkey traction speed slower than cattle	Muvirimi and Ellis-Jones 1999:12, Nengomasha *et al.* 2000:24, Starkey *et al.* (Starkey, Hanekom &c) 2000:105
Yoked donkeys slower than cattle	Hagmann and Prasad 1995:231/237, Prasad *et al.* 1991:236
Donkey traction speed similar to cattle (though more variable)	Ebenezer 1991:243, Jones 2008a:13, Yilmaz 2012:35-7
Donkey walking speed greater than cattle (and more variable)	Dijkman 1992:153-5, Fielding and Krause 1998:13, Marshall 2007:374, Mitchell 2017:35, Reh 1982:132, Shai *et al.* 2016:16
Faster than cattle for low-draught tasks	Andrianaivoarivony and Starkey 2003:9, Brodie 2008:303, Pearson and Vall 1998:309, Starkey 2000a:490

Traction speeds	
Bartosiewicz *et al.* 1997:31	Ox-cart on roads 5-6km/h, ploughing oxen 3.2-4 km/h
Bökönyi 1980:20	Ox-cart 1.8-2.5 km/h
Brodie 2008:301	Ox- and donkey-cart 3-4 km/h
Margueron 1989:121	Ox-cart 3.6 km/h
Piggott 1979:11	Ox-cart 3.7 km/h
Piggott 1983:90	Cattle 1.8-2.5 km/h

Renger 1990:271	Ploughing cattle (1 pair) 2.2-2.5 km/h
Viebig 1982:138-43	Single ox ploughing 2.4 km/h, pair 2.3 km/h; cows faster; donkey 2 km/h

Increasing the number of oxen in a plough-team tends to reduce speed (i)
Hagmann and Prasad 1995:237
Löwe 1986:20
Pearson and Vall 1998:309/312
Potts 1997:83
Renger 1990:271/275
Starkey 1989:36
Starkey 2000a:490
Viebig 1982:138-43

(i) Bartosiewicz *et al.* 1997:31: 'the number of oxen in a plough-team is not directly related to the loading of individual animals.'

Speed of pack or unladen donkeys walking	
Anderson and Dennis 1994:382	3-4 km/h
Brodie 2008:301	4-5 km/h
Dennis and Smith 1995:30	4-6 km/h
Jest and Ravis-Giordani 1985:17	3.5 km/h in steep terrain
Larsen 2015:176	5 km/h
Margueron 1989:122	3.6-5.4 km/h

Distance that pack donkeys can walk daily	
Ayo-Odongo *et al.* 2000:212	20km (with 100kg)

Binger 1892:311	16km
Brodie 2008:301	20km (or 30km in Kaneš texts)
Dennis and Smith 1995:30	25km
Dercksen 2004:255	25km (Kaneš texts)
Floor 2003:545	30-40km
Förster *et al.* 2013:211-12/307	10-14km (with 100-150kg load and food/ grazing available) or 25-40km (modern caravans); 25-30km with water every 3rd day (3rd-millennium BC Egyptian Abu Ballas train)
Goetze 1953:67	30km (Kaneš texts)
Hallo 1964:63	25-30km (texts)
Jepson 1994:159	40km
Jest and Ravis-Giordani 1985:17	18-27km
Jones 2011:4	30km
Köpp 2013:115	15km (3rd-millennium BC Egypt, including rests), 25-40km (3rd-millennium BC Egypt Abu Ballas trail), 35-40km (modern Egypt)
Larsen 2015:175-6	25-30km (Kaneš texts), reinforced by typical distance apart of Roman wayside inns and many European towns
Minka and Ayo 2007:44	20-40km
Mitchell 2017:35	24-30km
Pollock 1999:43	25km
Tabbaa 2003:5	40km

Height of modern non-specialist donkey (at withers)	
Pearson *et al.* 2001:57	Ethiopia – median 100cm in rural areas, a little taller in urban

Wilson 1978:185	Sudan – typical height c.105cm
Wilson 1981:140	Typical height c.105cm

Weight of modern African donkey (i)	
Fielding 1988:2	110-150kg
Hagmann and Prasad 1995:232	144kg
Mutua and Mwangi 2000:208	140kg
Pearson and Vall 1998:312	144kg
Renger 1990:270	160kg
Starkey 1997:193	120-180kg
Wilson 1981:140	125kg
Wilson 2000:15	Zimbabwe – larger than much of rest of Africa: 140kg
Yilmaz 2012:53	125kg

(i) 'Everyday' farm/ pack donkey; excluding specialist and riding donkeys; Gebreab (1992:105) gives a figure of 200kg but for (larger) donkeys pulling gharries

Donkey carrying capacity (iii)	
Anderson and Dennis 1994:382	Up to 70-80kg
Astour 1995:1403	65-75kg (texts)
Ayo-Odongo *et al.* 2000:212	60-100kg, depending on size
Binger 1982:490	70kg
Brodie 2008:301	50-80kg (or Kaneš texts 60-90kg)
Dennis and Smith 1995:30	40kg or more
Dercksen 2004:260/265	50-75kg
Digard 1982:139	60kg
Fielding 1988:2	40-50kg

Floor 2003:545	100-150kg (large donkey)
Förster *et al.* 2013:195/200/210-11	50-80kg or up to 100-150kg (modern long-distance caravan), or 200-300kg for short distances
Gebreab 1992:105	100kg, or 60kg in steep terrain
Holstrom 1934:34	68-82kg
Jepson 1994:159	60kg (120kg for short distances)
Jest and Ravis-Giordani 1985:17	c.50kg in steep terrain
Jones 2008c:18	60-80kg
Jones 2011:4	60-80kg
Leyland 2004:103	40kg (Maasai), up to 80kg (other groups)
Margueron 1989:122	Up to 100kg, depending on size
Marshall and Weissbrod 2009:70	50kg (Maasai, who do not heavily load donkeys)
Mattingly *et al.* 2007:344	65kg
Minka and Ayo 2007:44	94kg (large donkey)
Mitchell 2017:35	80-100kg for long distances
Nicolaisen 1963:110	Up to 100kg
Pankhurst 1968:283	45-55kg
Pearson *et al.* 2001:41-2	Median 100kg, up to 150kg for shorter distances
Pollock 1999:43	Up to 90kg
Raziq *et al.* 2010:112	Medium Pakistani donkey 160kg (60-80kg in hills)
Shai *et al.*2016:16	75-100kg
Starkey 1997:184	130kg
Upadhyay 1991:15	120-130kg short distances
Veenhof 1972:45	90kg (Kaneš texts)
Veenhof 1995:864	70kg (Kaneš texts)
Waithanji 2009:13	40-70kg local Kenya regulation
Wambui *et al.* 2004:25	80kg
Wilson 1981:139-40	50kg
Zenebe and Fekade 2004:71	100kg

(iii) Some low estimates by commentators may relate to ‘humane’ norms indicated by NGOs; donkeys are said to be able to carry one-third of their body-weight for long journeys (Dennis and Smith 1995:30, Förster *et al.* 2013:195), but often much more for shorter distances

Human porter carrying capacity	
Anderson and Dennis 1994:382	25-35kg
Ayo-Odongo *et al.* 2000:212	20-30kg
Bairoch 1988:11	35-40kg
Binger 1892:313	30-40kg
Brodie 2008:301	30kg
Clark and Haswell 1970:195/202	Numerous examples worldwide, ranging from 20-100kg, clustering at 30-50kg
Dennis and Smith 1995:12	55kg male, 25-30kg female
Dixit 1995:37	40kg, up to 80kg for short distances; Nepal – 60-83kg and up to 108kg (iv)
Drennan 1984:105	20-50kg
Fisher 1990:32	Nepal – 36-55kg (iv)
Hassig 1985:32	23kg
Holstrom 1934:33	27kg
Jones 2011:4	30kg
Malville 1999:2	Nepal – 30-45kg or up to 90kg (iv)
Mitchell 2017:35	25-35 kg for precolonial African porters
Ndayambaje 2008:28	40-50kg
Pankhurst 1968:283	25kg
Reyman and Dirks 1985:890	Up to 63kg or 91kg
Sluyter 1993:195	Up to 90kg
Stein 1999:58	35-40kg

Tourtellot 1978:74-5	Range of examples worldwide, ranging from 22-64kg, average maximum 45kg

(iv) The porters of Nepal regularly carry twice or more the loads of porters elsewhere; this phenomenon is discussed by the authors referenced above

II.29 Animal-driven stationary power

WORKING ANIMALS FOR STATIONARY POWER	Range of uses in modern and ancient times	Used in Africa/ Near East today	Used in recent past in developed world	Used in Classical times
Barclay 1980:56				*
Barrett *et al.* 1982:8		*		
Blench *et al.* 2004	p212-15	p212-13		
Bodson 1985:8				*
Bulliet 1975:217	*	*		
Butterlin and Margueron 2006:317	*			
Forbes 1955:85				*
Löwe 1986:16	*		*	
McCown *et al.* 1979:304	*	*		
McShane and Tarr 2006:365	*		*	
Starkey 2000a:482-3	*	*		
Starkey 2011	p18	p18/33		
Wilson 1981:143	*	*		
Zeuner 1963:380	*	*		

II.30 Cattle domestication and domestication theory

DOMESTICATION OF CATTLE	First domestic-ation of (taurine) cattle	Theories of early incidence (patchy or multiple or protracted)	Evidence from faunal remains	Domestic-ation for milk (M) or work (W)	Evidence of working cattle in S Levant by 4th m BC	Evidence of working cattle in Mesopot-amia by 4th m BC	Focus until recently on oxen (rather than cows/ donkeys) for work in ANE
Arbuckle 2012a:207-8	*						
Bar 2014:127					*		
Bogucki 1993:497				* W			
Bollongino *et al.* 2012:2101-3	*	*	*				
Bourke 2001:117					*		
Bradley and Magee 2006:317	*		*				
Chapman 1983:112						*	
Charvát 2002:61							*
Clutton-Brock 2012	p42			p27 M		p28/42	
Ellison 1982:173							*
Grigson 1995					p258	p220	
Halstead and Isaakidou 2011:65						*	
Hole and Flannery 1967:181						*	

DOMESTICATION OF CATTLE	First domestic-ation of (taurine) cattle	Theories of early incidence (patchy or multiple or protracted)	Evidence from faunal remains	Domestic-ation for milk (M) or work (W)	Evidence of working cattle in S Levant by 4th m BC	Evidence of working cattle in Mesopot-amia by 4th m BC	Focus until recently on oxen (rather than cows/ donkeys) for work in ANE
Levy 1995:232					*		
Littauer [1983] 2002:8						*	
Marshall *et al.* 2014	p6156	p6154					
Moorey 1994:3						*	
Oates 1980:306						*	
Pullen 1992:53							*
Renger 1990							*
Russell [K.] 1988:24/144			*				
Russell [N.] 2012	p211	p226	p220	p226 M			
Sherratt 2003						p242-3	*
Sherratt 2006						p333	*
Turcanu' and Bejenaru 2014	*	*					
Vigne and Helmer 2007:9/34			*	* M			
Wapnish and Hesse 1991:26-7					*		

DOMESTICATION OF ANIMALS	Behaviour patterns in the wild key in domestication potential	Animals bond together in the wild	Achieving bonding with humans	Uruk Archaic texts – captives and animals referred to similarly
Algaze 2001a:212				*
Algaze 2008:128				*
Algaze 2013:81				*
Bateson 1988:14		*		
Stephen Blakeway pers. comm. 2017			*	
Campbell 2005:95				*
Clutton-Brock 2012:7	*			
Hale 1962:27	*			
Ingold 1980:97/172			*	
Kiley-Worthington 1998:7-10		*		
Littauer [1983] 2002:8	*			
McShane and Tarr 2006	p365-6		p366	
Marshall and Asa 2013:479/481-2	*		*	
Midgeley 1983:108-13		*		
Reh 1982:77			*	
Schlichtherle 2006:172			*	
Schmitz *et al.* 1991:78			*	
Tani 1996:403-5				*
Wilkinson 1972:28-9	*			

II.31 Ploughing factors

PLOUGHING FACTORS	Maresha ard plough in Ethiopia	Decisions influenced by terrain, altitude, climate, animal disease	Cash crops plough-oriented	Year-round utilisation of animals is a key economic factor	Young men may migrate to areas with better work	Wide spectrum of views on yield per labour unit	Hseholds have other aims than yield and profit	Notes on multiple factors affecting uptake/ choices
Abernethy 2005:viii-xi							*	
Astatke and Mohammed-Saleem 1994:301			*					
Barrett *et al.* 1982		p103		p8		p61		
Blench 1997				p23				p23-4/41/51
Boserup [1965] 2005:41						*		
Carswell 1997					p11	p3-4/7	p11	
Chayanov 1986:xiii-xix							*	
Delgado and McIntire 1982					p190-191	p188-194 (i)	p189	
de Wilde 1967							p53/76-7	p23-4/96-7/111
Desta 1994:454	*							
Ellis 1988:217/221-4								*
Fall *et al.* 2003:29					*			
Farnham 1997		p23	p153		p25/32	p163	p23-24/31/164-166	p23-4/28-9/100/127
Gboku 1988					p312			p315-7
Halstead 1987a:84							*	

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Halstead 1990:189			*					
Halstead 1995:17								*
Haufiku *et al.* 2004					p178			
Havard *et al.* 2007		p29	p29	p30				p28-9
Henriksson and Lindholm 2000:11								*
Isaakidou 2008:105							*	
Isager and Skydsgaard 1992:104				*				
Jaeger and Matlon 1990		p46-7	p37	p35		p39		p35-7/46-7
Jolly and Gadbois 1996:453-6/464						*		p454
Kjaerby 1983	p131-5			p143		p24-27	p28	
Kruit 1994:474		*						
Landais and Lhoste 1990					p227	p224	p224	p228
Lawrence and Pearson 2002:101		*						*
Lhoste 2004:126/128							*	
Low 1986					p18/127		p28	
McCann 1995	p45		p69-70			p85		
McCown *et al.* 1979			p305		p330			
Makwanda *et al.* 2000:173			*					
Münzinger 1982			p27					p21-47
Netting 1974:24						*		

PLOUGHING FACTORS	Maresha ard plough in Ethiopia	Decisions influenced by terrain, altitude, climate, animal disease	Cash crops plough-oriented	Year-round utilisation of animals is a key economic factor	Young men may migrate to areas with better work	Wide spectrum of views on yield per labour unit	Hseholds have other aims than yield and profit	Notes on multiple factors affecting uptake/ choices
Orev 1972:236				*				*
Panin 1988						22/27/40-43/54-56/66-70/88/115/129/138/157-8/174	p56	
Panin and Ellis-Jones 1994:95-8								*
Pingali *et al.* 1997		p72-4				p106 (i)		p 1/4-11/34/38-40/57/73/76/92-6/112
Renger 1990	p273							p269
Ruthenberg 1964:183-4								*
Sherratt 2006:346				*				
Simoons 1960:6		*						
Singh 1988:165/167/31						*		
Sosovele 1994:318						* (i)		
Starkey 1981b:20			*					
Starkey 1986:6	*							
Starkey 1987:37-40								*
Starkey 1994a	p69	p74					p75	
Starkey 1994c:306								*

PLOUGHING FACTORS	Maresha ard plough in Ethiopia	Decisions influenced by terrain, altitude, climate, animal disease	Cash crops plough-oriented	Year-round utilisation of animals is a key economic factor	Young men may migrate to areas with better work	Wide spectrum of views on yield per labour unit	Hseholds have other aims than yield and profit	Notes on multiple factors affecting uptake/ choices
Tabbaa 2003:5		*						
Temesgen 2000:72	*							
Tibbs 1989				p12				p9-12
Tiffen 1976				p130				p127-31
Vall *et al.* 2002b:120-24								*
Wellard and Mortimore 2000:232								*
Westneat *et al.* 1988:334			*					

(i) Conclusion that labour per yield is shifted not reduced with ox-ploughing

NUMBER OF PLOUGH OPERATORS	Several people used to operate plough	One person used to operate plough
Farnham 1997:102	*	
Haufiku *et al.* 2004:179	*	
Kjaerby 1983:131		*
Long 1968:22	*	
Mulanda *et al.* 2000:306		*
Renger 1990:271	*	
Schmitz *et al.* 1991:78-9		*
Starkey 1986:7		*

NUMBER OF PLOUGH OPERATORS	**Several people used to operate plough**	**One person used to operate plough**
Starkey and Apetofia 1986:16		*
Starkey *et al.* (Starkey, Jaiyesimi-Njobe &c) 2000:23		*

PLOUGHING AND LIGHT/ SANDY/ ARID SOILS	**Deep ploughing unnecessary/ damaging for light soils**	**Light soils easy to plough *(D: so donkeys can be used)***
Aganga and Tsopito 2004:159		* D
Barrett *et al.* 1982:25		*
Blench 1997:52	*	* D
Bodson 1985:8		* D
Brodie 2008:303	*	* D
Bwalya 1999:133-8	*	
Chelemu and Nindi 1999:112-3	*	
Delgado and McIntire 1982:191	*	*
de Wilde 1967:110		*
Fall and Faye 1999:143-4	*	
Farnham 1997:23		*

PLOUGHING AND LIGHT/ SANDY/ ARID SOILS	**Deep ploughing unnecessary/ damaging for light soils**	**Light soils easy to plough *(D: so donkeys can be used)***
Fielding 1987:25		*
Gourou 1961:123	*	
Hagmann and Prasad 1995:237	*	
Haufiku *et al.* 2004:176		* D
Havard *et al.* 2007:29	*	
Henriksson and Lindholm 2000:12/37	*	
Isager and Skydsgaard 1992:22	*	
Jaeger and Matlon 1990:36-7/47	*	
Kaoma-Sprenkels *et al.* 1999:121	*	
Kilemwa 1999:70	*	
Kjaerby 1983:38	*	
Kruit 1994:477	*	
McCown *et al.* 1979:308		*
Mpande 1994:152		* D
Oates and Oates 1976:119-20	*	
Pearson and Vall 1998:315		* D
Pingali *et al.* 1997:4/57/74	*	*
Potts 1997:73-5	*	
Sarpaki 1992:62	*	

PLOUGHING AND LIGHT/ SANDY/ ARID SOILS	**Deep ploughing unnecessary/ damaging for light soils**	**Light soils easy to plough *(D: so donkeys can be used)***
Schmitz *et al.* 1991:116/130	*	
Siacinji-Musiwa 1999:28-9	*	
Starkey 2000a:490	*	*
Starkey *et al.* (Starkey, Hanekom &c) 2000	p77	p113 D
Temesgen 2000:70	*	
Tibbs 1989:9	*	
Uzureau 1974:112	*	
Westneat *et al.* 1988:334		*
Yilmaz 2012:49/59-60	*	* D

DONKEYS PLOUGHING THEN AND NOW	**Egypt then and now: donkeys rarely used for ploughing (i)**	**Greece: donkeys used for ploughing in Classical times**	**Greece/ Turkey: varying modern use of donkeys for ploughing**	**Donkeys used in some Near Eastern regions today**
Brewer 2002:446	*			
Brodie 2008:303		*		
Floor 2003:213				*
Halstead 2014:17/36			*	
Halstead and Isaakidou 2011:62			*	
Halstead and Jones 1989:48			*	

DONKEYS PLOUGHING THEN AND NOW	Egypt then and now: donkeys rarely used for ploughing (i)	Greece: donkeys used for ploughing in Classical times	Greece/ Turkey: varying modern use of donkeys for ploughing	Donkeys used in some Near Eastern regions today
Isager and Skydsgaard 1992:22		*		
Köpp 2013:110	*			
Palmer 1998:142				*
Shai *et al.* 2016:4	*			
Starkey 2000a:479	*			
Tabbaa 2003:5-6				*
Yilmaz 2011:¶1			*	
Yilmaz 2012:59			*	
Zeuner 1963:377	*			

(i) Ancient Egypt: donkeys nevertheless used for pack, and to carry litters and for riding (Köpp 2013:110), and for treading seed into furrows and for threshing (Blench 2000:342)

INTENSIVE/ EXTENSIVE FARMING	'Intensive' used by some for larger-scale farming	'Extensive' or 'non-intensive' used by others for this, with 'intensive' for small-scale
Alden Smith *et al.* 2010:92	*	
Bairoch 1988:13	*	
Bogaard 2004:21		*
Bogaard 2005:179		*
Borgerhoff Mulder *et al.* 2009:685		*

INTENSIVE/ EXTENSIVE FARMING	'Intensive' used by some for larger-scale farming	'Extensive' or 'non-intensive' used by others for this, with 'intensive' for small-scale
Boserup [1965] 2005:43/65/73	*	
Bourke 2001:118	*	
Bowles *et al.* 2010:11		*
Carswell 1997 (i)	p3/7/10-11	p21
Charles 1990:47	*	
de Wilde 1967:76-7	*	
Delgado and McIntire 1982	p191	p191/192
Ellis 1988:222	*	
Farnham 1997:23		*
Galvin 1987:127	*	
Gilbert 1983:109	*	
Goody 1971:25	*	
Goody 1976	p24	p32
Gurven *et al.* 2010:49-50	*	
Halstead 1987a:83-84		*
Halstead 1990:188-9		*
Halstead 1995:16-18		*
Isaakidou 2008:108		*
Isaakidou 2011:98-9		*
Kjaerby 1983:11/24	*	
Landais and Lhoste 1990:221	*	
Langha 1999:239	*	

INTENSIVE/ EXTENSIVE FARMING	'Intensive' used by some for larger-scale farming	'Extensive' or 'non-intensive' used by others for this, with 'intensive' for small-scale
McCown *et al.* 1979:304		*
Makwanda *et al.* 2000	p173	p174
Pearson and Vall 1998:310		*
Shenk *et al.* 2010:66/79	*	
Sherratt 1981	p262	p292
Sherratt 1983:100		*
Sherratt 1997c:210/226		*
Sherratt 2003:243	*	
Sherratt 2006:352		*
Styring *et al.* 2017		*

(i) Carswell (1997) defines 'intensive' as increasing yield per hectare, extensification as increasing hectarage

II.32 Ploughing animals in antiquity

PLOUGHING ANIMALS IN ANTIQUITY	Paired animal use in Mesopotamia	Code of Hammurabi – differential rents for plough oxen	Up to 8 animals per team in texts	'Teams' in texts contain trainee or reserve animals	Plough sign in late 4th millennium BC texts	Ploughing commonly mentioned from end of 4th m BC
Bartosiewicz *et al.* 1997:9					*	
Civil 1994	p58			p74		
Ellison 1982					p180	p178
Grigson 1987:229					*	
Heimpel 1995	p96	p88-89	p96/135	p94-7/135		p93
Oates and Oates 1976:119					*	
Pétrequin *et al.* (Pétrequin, Pétrequin and Bailly) 2006:362	*					
Potts 1997	p83	p83			p75	
Renger 1990:275	*	*		*		
Sherratt 1981:263					*	
Sherratt 1987:1					*	
Sherratt 2003:243						*
Sherratt 2006	p342					p343
Stol 1995	p189	p192/206	p189			p200
Zarins 2014:188					*	

CENTRALLY-CONTROLLED MESOPOTAMIAN AGRICULTURE	Crop types	Landless labour source required
Ellison 1982:173	*	
Farnham 1997:18		*
Goody 1976:33		*
Halstead 1990:19	*	
Halstead 1995:18		*
Heimpel 1995:118	*	
Hesse and Runge-Metzger 1999:226		*
Jaeger and Matlon 1990:37		*
Powell 1984:68	*	

II.33 Weeding issues

WEEDING ISSUES	Weeding major bottle-neck in animal ploughing	Weeds signific-antly reduce yield	Source of landless labour needed for bottle-necks	Ploughing – weeds because crops farther apart	Ploughing may increase weeds	Weeds may be beneficial/ tolerat-ed as harmless
Bogucki 1993:496	*					
Charles 1990:54						*
Delgado and McIntire 1982:189	*			*		
de Wilde 1967	p77/98				p99	

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Farnham 1997	p28-29/163	p28	p18			
Goody 1976:33			*			
Halstead 1987a:82-3			*			
Halstead and Jones 1989:43						*
Havard *et al.* 2007:29-30	*					
Hesse and Runge-Metzger 1999:226			*			
Jaeger and Matlon 1990	p43		p37			
Jolly and Gadbois 1996:454/465	*					
Kilemwa 1999:70-71					*	
Kjaerby 1983:27	*	*				
Laurent 1968:243	*					
Lekezime 1988:351	*			*		
McCown *et al.* 1979:306	*					
Makwanda *et al.* 2000:173-4	*					
Mongomongo and Gembe 2000:185	*	*				
Oates 1980:306						*
Orev 1972:236	*	*				
Panin 1988:71					*	
Sarpaki 1992:62						*
Simoons 1960:75						*
Sosovele 1994:318	*					

WEEDING ISSUES	Weeding major bottle-neck in animal ploughing	Weeds signific-antly reduce yield	Source of landless labour needed for bottle-necks	Ploughing – weeds because crops farther apart	Ploughing may increase weeds	Weeds may be beneficial/ tolerat-ed as harmless
Starkey *et al.* (Starkey, Hanekom &c) 2000:94		*				
Stevens 1994:168/177		*				
Temesgen 2000:71						*
Tibbs 1989	p10			p9		
Tiffen 1976:130	*					

ANIMAL-POWERED WEEDING	A solution to yield issues	Row-planting necessary	Weeding between rows is complex	Done with a single animal
Bangura 1988:295			*	
Barrett *et al.* 1982	p68	p48		
de Wilde 1967:98			*	
Forbes 1976:11	*			
Halstead 1987a:82-3	*			
Havard *et al.* 2007:28	*			
Jaeger and Matlon 1990:39		*		
Jolly and Gadbois 1996:465			*	
Kanu 2000:262	*			
Kjaerby 1983:27/39/41		*		
Lekezime 1988:351		*		
Makwanda *et al.* 2000	p174	p175	p175	p175

ANIMAL-POWERED WEEDING	A solution to yield issues	Row-planting necessary	Weeding between rows is complex	Done with a single animal
McCown *et al.* 1979:306	*			
Mulanda *et al.* 2000:306		*	*	
Panin 1988:55	*			
Pearson and Vall 1998	p310			p315
Starkey 1991:82	*			
Uzureau 1974:113	*			

II.34 Cultural and other differences in working-animal use

CULTURAL AND OTHER DIFFERENCES IN WORKING-ANIMAL USE	Adjacent groups using working animals differently	May relate to pastoralist or agriculturalist focus	Fear of cattle leading to non-adoption	Prestige herding of cattle may lead to use…	…or to non-use for work	Zimbabwe: oxen preferred, prejudice against donkeys
Ahmadu *et al.* 2000:266	*			*		*
Bangura 1990	p324	p324-5		p324	p324-5	
Cochin 1995:59	*					
Comaroff 1985:60-72/146		*				
Daramola 1999:236	*	*		*		
de Wilde 1967:111			*			
Dennis 1999:168	*					*
Farnham 1997	p127	p127	p100/127		p127	

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Fernando and Starkey 2004:14	*					
Gboku 1988:315-8	*					
Inns 1980:4			*			
Jones 1991:312-3						*
Kleene and Vall 2005:4	*					
Laurent 1968:255			*			
Martinho de Almeida and Alfaro Cardoso 2008:14	*					
Mofya 2004:141						*
Mpande 1994:152						*
Münzinger 1982:23		*				
Muvirimi and Ellis-Jones 1999:12						*
Mwanzia 2000:240	*	*			*	
Prasad *et al.* 1991:236						*
Reh 1982:77			*			
Robertshaw and Collett 1983		p67/73		p73		
Starkey 1981a:15	*	*			*	
Starkey 1981b:21	*	*			*	
Starkey 1987:37	*					
Wood and Milimo 1994:344					*	

LOW VIEW OF DONKEYS	Donkeys despised in modern times	Negative official attitudes in Africa and elsewhere/ ignored	Not on veterinary curricula	Not included in bride-price in Africa, unlike cattle	Commonly viewed as stubborn/ obstinate	Donkeys gender-neutral/ suitable for use by women
Aganga and Seabo 2004:155						*
Ahmadu *et al.* 2000:266				*		
Burden and Thiemann 2015:376					*	
Borwick 1981:15					*	
Brewer 2002:447					*	
Bwalya 2004:131				*		
Cochin 1995:55	*					*
Daborn 2011:¶1		*				
Davis 2011:¶4	*				*	
de Aluja and Lopez 1991:2		*	*			
Denis 1995:40					*	
Greenfield *et al.* 2012:43					*	
Haufiku *et al.* 2004:178						*
Jacobs 2001:489	*	*				
Jones [P.A.] 2010:133	*				*	
Kalawoun 2016	*					
Kaumbutho *et al.* 2004:98					*	
Kreike 2010:94-101	*	*				
Laurans 1985	*				*	
Marshall [F.] and Asa 2013:490					*	

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Marshall [F.] and Weissbrod 2009:72	*					*
Marshall [K.] and Starkey 1998:33	*	*	*			*
Mitchell 2017:29		*	*			
Mpande 1994:152	*					
Ovadia 1992:24					*	
Patrick *et al.* 2000:260					*	
Pearson *et al.* 2001	p81	p3/81				p2/27 (i)
Power 2004:131	*					
Pritchard 2014:4		*				
Schmitz *et al.* 1991:57	*				*	
Starkey 1994b:4	*	*				
Starkey *et al.* (Starkey, Hanekom &c) 2000:105	*					
Starkey 2011		p33	p45			p26
Swai and Bwanga 2008:i				*		
Waithanji 2009:18-20	*				*	
Wambui *et al.* 2004:27-8						*
Zaman *et al.* (Zaman, Kumar and Compston) 2014:19		*				

(i) Though men still largely control donkey use

II.35 Small farms and independent enterprises in Mesopotamia

INDEPENDENT ENTERPRISES IN MESOPOTAMIA	Private trade/ small farms in 4th/3rd-m. Mesopotamia	Texts etc urban, most of pop-ulation rural
Adams 2008	p11-14	p1
Algaze 2013:81		*
Asher-Greve 2013:359		*
Foster 1977:31	*	
Gelb *et al.* 1991:2/17/25-6	*	
Lamberg-Karlovsky 1996:73-6/86	*	
Liverani 1996:13	*	
Liverani 2006:25/35/44/61	*	
McMahon 2013:470		*
Pollock *et al.* 1996:698	*	
Postgate 2003:12-13	*	
Shenk *et al.* 2010:66	*	
Steinkeller 2007	*	
Stone 1999:204-12	*	
Stone 2007:216		*

II.36 Southern Levant in the late 4th millennium BC

SOUTHERN LEVANT IN THE LATE 4th MILLENNIUM BC	Canaan-Egypt caravan route in EBI	Were mobile pastoralists/ nomads merchants as well as caravaneers?
Amiran 1985:191	*	
Bar 2014:129	*	
Ben-Tor 1986	p9-10	p8 Possibly
Cribb 1991:13-14		* Possibly
Epstein 1984:176	*	
Esse 1991:103/175	*	
Finkelstein 1995:80	*	
Greenfield *et al.* 2012:38		* No
Gophna 1987:16-18	*	
Harrison 1993:88-91	*	
Hartung 2014	*	
Hassan 1988:160	*	
Hoffmeier and Moshier 2013:485-7/507	*	
Ilan 2002:316-7	*	
Joffe 1991	p3/22-5	p28/38 No
Kafafi 2014	*	
Levy 1995:242	p242	
Levy and van den Brink 2002:18-20	p18-20	
Marfoe 1987:26-7	*	
Milevski 2011:179	p179	

SOUTHERN LEVANT IN THE LATE 4th MILLENNIUM BC	Canaan-Egypt caravan route in EBI	Were mobile pastoralists/ nomads merchants as well as caravaneers?
Oren 1973:198/205	*	
Oren 1989	p389/402	p401 Not necessarily
Sherratt 1983:96	*	
Sherratt 1997c:209-10	*	
Wengrow 2006:39	*	
Zarins 2014:79-80	*	

II.37 Inequality factors

ANTHROPOLOGICAL INEQUALITY-FACTOR MODELS	Wealth transmission across generations is a key inequality factor	Ownership of land is the inequality key
Alden Smith *et al.* 2010 (i)	*	*
Borgerhoff Mulder *et al.* 2009	*	*
Bowles *et al.* 2010 (i)	*	*
Goody 1976:107-9		*
Gurven *et al.* 2010 (i)	*	*
Kelly 2010 (i)	*	

ANTHROPOLOGICAL INEQUALITY-FACTOR MODELS	Wealth transmission across generations is a key inequality factor	Ownership of land is the inequality key
Shenk *et al.* 2010 (i)	*	*
Shennan 2010 (i)	*	

(i) Current Anthropology 2010, 51/1

Restricted access to work animals leads to inequality	
Goody 1976:107	Mediaeval Europe, and modern Africa
Halstead 1987b:82	Bronze Age Aegean
Halstead 2014:318	Neolithic Aegean
McCann 1984:8-9	Recent Ethiopia
McCann 1995:78	Recent Ethiopia
Philip 2001:187	Bronze Age Levant
Pullen 1992:53	Bronze Age Aegean
Sherratt 2006:353	Neolithic Europe
Singh 1988:161	Recent Burkina Faso

Plough agriculture increases women's field-work
Boserup 1990:23 Kjaerby 1983:62/143 Lombe *et al.* 1994:284 Mofya and Chisenga 2000:128

Sosovele 1994:318
Spencer and Byerlee 1976:879
Starkey 1988:109

II.38 Boat transport in Mesopotamia

RIVER-BOAT TRANSPORT IN MESOPOTAMIA	Examples of focus on boat transport	Advantages in volume over pack	Problems with boat transport	Taxation and raids on boats	Rafts, carried upstream by donkeys
Admiralty War Staff 1916			p163/169-71		p166-8
Algaze 2001a:204	*				
Algaze 2008:50		*			
Astour 1995:1403					*
Connan 2005:23-4					*
Cooper 1992		p11	p6-8/12	p4/7-8	
Crawford 2013:448	*				
de Graeve 1981			p13-18/151-2	p15	p79-92
Finet 1969			p42	p46 (i)	
Grant 1937:166-7			*		
Margueron 1989:122-3	*	*			
Moorey 1994	p10	p10	p8		p6/10
Muhly 1973:299			*		
Renfrew *et al.* 1966:53					*
Stein 1999		p83			p117
Veenhof 1972:338				* (i)	
Wright 2001:127		*			

(i) Donkey caravans were also taxed and raided (see APP II.22) but could take detours

II.39 Use of female donkeys

FEMALE DONKEYS	Male donkeys can be aggressive near females	Reports of prejudice about work rate of females	Pregnant females can work until an advanced stage
Aganga *et al.* (Aganga, Patrick &c) 2000:265			*
Dennis and Smith 1995:112	*		
Digard 1982:135			*
Fielding 1988:2	*		
Jones 1997:70			*
Mutemi 2008:69		*	
Starkey and Mutagubya 1992:26			*
Waithanji 2009:34		*	
Wambui *et al.* 2004:28	*		*
Zenebe and Fekade 2004:71		*	*

II.40 Interaction between mobile pastoralists and sedentary groups

INTERACTION BETWEEN MOBILE PASTORALISTS AND SEDENTARY GROUPS	Origins and timing of mobile pastoralism	Trad. inter-action of nomads/mob. pastoralists w sedentary groups	Spectrum of pastoral and agricultural focus, incl. within ethnic groups	Benefits to both parties of pastoralists grazing animals on agric land	Pastoral/ agric cooperation threatened where shortage of land or water	Division between mobile pastoralists and nomads
Akkermans and Schwartz 2003:150		*				
Alizadeh 2008		p78	p89		p83	p81
Altaweel and Paulette 2013:204/208		*				
Barker 1999:276	*	*				
Bernbeck 2008:44-7			*			
Bowles *et al.* 2010:11			*			
Casana 2013	p270	p269	p269			
Chang and Koster 1986	p104-5	p104-5	p98/112	p112	p104	
Chapman 1983:114	*					
Clutton-Brock 2012:44	*					
Cribb 1991	p9	p15	p10			p16
Duistermaat and Akkermans 1996:36		*				
Finkelstein 1995:38/80		*				
Finkelstein and Perevolotsky 1992:67/74-5		*				
Galvin 1987	p120-29	p120				

INTERACTION BETWEEN MOBILE PASTORALISTS AND SEDENTARY GROUPS	Origins and timing of mobile pastoralism	Trad. inter-action of nomads/mob. pastoralists w sedentary groups	Spectrum of pastoral and agricultural focus, incl. within ethnic groups	Benefits to both parties of pastoralists grazing animals on agric land	Pastoral/ agric cooperation threatened where shortage of land or water	Division between mobile pastoralists and nomads
Gifford-Gonzalez 2005:189	p189		p188			
Gilbert 1983:107		*				*
Halstead 1987a:79				*		
Halstead 2005			*			
Helms 1987:51		*				
Hesse and Wapnish 2002:457		*				
Hole 1978:132-3		*				
Jolly and Gadbois 1996:456			*			
Jones [J.E.] 2010:14			*			
Khazanov 1984	*	p3	p20			p16
Kohler-Rollefson 1992:11		*				
Landais and Lhoste 1990		p229-30	p219		p229	
Levy 1983	p15/29-32/104-7	p18		p18	p30/104	
McCown *et al.* 1979		p300		p300-02 (i)	p301-5	
Matthews 1978:1			*			
Nicolaisen 1963:482			*			
Pingali *et al.* 1987:92-4			*			
Porter 2012	p10	p10/12/22/24	p10	p22	p22	p12
Potts 2013	*					
Rosen 1998:92		*				

INTERACTION BETWEEN MOBILE PASTORALISTS AND SEDENTARY GROUPS	Origins and timing of mobile pastoralism	Trad. inter-action of nomads/mob. pastoralists w sedentary groups	Spectrum of pastoral and agricultural focus, incl. within ethnic groups	Benefits to both parties of pastoralists grazing animals on agric land	Pastoral/ agric cooperation threatened where shortage of land or water	Division between mobile pastoralists and nomads
Rosen 2008:119		*				
Rowton 1973b		p249			p252	
Rowton 1973a		p203				p201-3
Rowton 1974:1-4/19-20		*				
Sasson 2010:15-17			*			
Sherratt 1981		p262/289-90	p289			
Tiffen 1976:123-30				*		
Vila 1998:143	*				*	
Wapnish 1981:109		*				*
Watson 1983:241		*				
Zarins 2014		p249	p289			
Zeder 1994:176	*					

(i) Though there can be conflict if herds cause damage (McCown *et al.* 1979:301)

II.41 Sub-Saharan African history of working animals

SUB-SAHARAN AFRICAN ADOPTION OF WORKING ANIMALS	Working animals often only recently introduced	Draught cattle introduced, for cash crops	Factors in low success of early working-animal initiatives	Period of emphasis on mechanis-ation/ 'modernis-ation'	Mechanis-ation then recognised as unsuitable	Official initiatives still often unsuitable/ ignored local situation	Use for transport may be more attractive than for ploughing
Barrett *et al.* 1982		p13	p13-24				p106 (i)
Carswell 1997:13			*				
Clutton-Brock 2012:116	*						
de Wilde 1967:36-40/112			*				
Farnham 1997:20-26			*				
Goody 1971:76				*			
Goody 1976:25-33	*						
Havard *et al.* 2007:28		*					
Kaumbutho 2003:8				*		*	
Kjaerby 1983	p46	p48	p12-14/28-39				
Kruit 1994:475	*	*	*			*	* (i)
Landais and Lhoste 1990:222						*	*
Lombe *et al.* 1994:285	*						
Long 1968	p3	p3/20					
Lubumbe 1994:366	*						
Marshall and Starkey 1998:33						*	

SUB-SAHARAN AFRICAN ADOPTION OF WORKING ANIMALS	Working animals often only recently introduced	Draught cattle introduced, for cash crops	Factors in low success of early working-animal initiatives	Period of emphasis on mechanis-ation/ 'modernis-ation'	Mechanis-ation then recognised as unsuitable	Official initiatives still often unsuitable/ ignored local situation	Use for transport may be more attractive than for ploughing
Münzinger 1982	p21-49	p21					
Panin 1988				*	*		
Panin and Ellis-Jones 1994	p94			p94			p96
Phiri 1994:144	*				*		
Pingali *et al.* 1987		*	*	*			
Sosovele 1994:318	*	*					
Starkey 1994a	p71					p81	
Starkey 1994c:308				*			
Starkey 2011:34		*					
Starkey and Apetofia 1986:16		*					
Vall *et al.* 2002b		p117				p120	
Wood and Milimo 1994:345					*		

(i) Particularly in the case of donkeys

WORKING ANIMALS IN ETHIOPIA		
Maresha plough used in Ethiopia for millennia; brought in or developed independently	**3rd-millennium BC texts reporting donkey-caravans between Egypt and Ethiopia**	**Wild donkey distribution extends into northern Ethiopia**
McCann 1995:5/37-9/70 Phillipson 1993:351-3 Simoons 1960:12-14 Starkey 2000a:479-81	Blench 2000:344 Starkey 2000a:481	Epstein 1984:175 Kimura *et al.* 2010:16 Shackelford *et al.* 2013:4172

II.42 Fodder for donkeys in Mesopotamian texts

FODDER FOR DONKEYS IN MESOPOTAMIAN TEXTS		Mention of fodder for donkeys/ hybrids	Discussion of ration sizes for donkeys/ hybrids
Heimpel 1994	*Umma and Girsu texts, late 3rd millennium BC*	p11/14-21	p21
Sallaberger 1996	*Beydar texts, second half of 3rd millennium BC*	p99-103	p102-3
Sallaberger 1998:173-4	*Beydar texts, second half of 3rd millennium BC*	*	*
Sallaberger 2014	*Mari texts, mid 3rd millennium BC*	p341/347	p347

FODDER FOR DONKEYS IN MESOPOTAMIAN TEXTS		Mention of fodder for donkeys/ hybrids	Discussion of ration sizes for donkeys/ hybrids
Van Lerberghe 1996:120	*Beydar texts, second half of 3rd millennium BC*	*	
Zarins 2014:161/191/222-5/230		*	

II.43 Other equids in Mesopotamia

ONAGERS AND ONAGER/ DONKEY HYBRIDS	Similar to donkeys… *D: and domesticable/ U: but untameable*	Habitats: donkeys rocky hills (i), onagers sandy plains	Were native to much of the Ancient Near East	Distribution may have overlapped with donkey	Evidence of large-scale hunting in ANE pre 4th m BC	Continued to be hunted in ANE 4th-3rd m BC onwards	Onager/ donkey hybrids early/ mid 3rd m BC: texts/ depictions
Akkermans and Schwartz 2003:173					*		
Alizadeh 2008:95					*		
Bökönyi 1978:61					*		
Bökönyi 1980:15	* U						
Cattani and Bökönyi 2002:33					*		
Clutton-Brock 1992:89						*	
Clutton-Brock 2001:332	* U						

ONAGERS AND ONAGER/ DONKEY HYBRIDS	**Similar to donkeys… *D: and domesticable/ U: but untameable***	**Habitats: donkeys rocky hills (i), onagers sandy plains**	**Were native to much of the Ancient Near East**	**Distribution may have overlapped with donkey**	**Evidence of large-scale hunting in ANE pre 4th m BC**	**Continued to be hunted in ANE 4th-3rd m BC onwards**	**Onager/ donkey hybrids early/ mid 3rd m BC: texts/ depictions**
Clutton-Brock 2012:29	* U		*				
Davis 1980:290	* U		*				
Epstein 1984:182	* D		*				
Feh *et al.* 2002:63			*				
Geigl and Grange 2012		p89	p89	p92-3			
Gilbert 1991:100					*	*	
Gilbert 2002:17		*					
Groves 1974	105/163 D	p110	p100-102				
Groves 1986:46		*					
Hole and Flannery 1967:181/193/260					*		
Kirkbride 1974:90					*		
Littauer and Crouwel 1979	p28/34 D						p28
Maekawa 1979a:113-8	* D						*
Milevski 2011:177							*
Noble 1969:486	* D						
Ovadia 1992:20					*		
Postgate 1986:196-7	p194/197 U						p194-200
Potts 2014:645	* U						*
Shackelford *et al.* 2013:4172		*					
Shah 2002:73			*				
Sherratt 2003:240		*					

ONAGERS AND ONAGER/ DONKEY HYBRIDS	Similar to donkeys… *D: and domesticable/ U: but untameable*	Habitats: donkeys rocky hills (i), onagers sandy plains	Were native to much of the Ancient Near East	Distribution may have overlapped with donkey	Evidence of large-scale hunting in ANE pre 4th m BC	Continued to be hunted in ANE 4th-3rd m BC onwards	Onager/ donkey hybrids early/ mid 3rd m BC: texts/ depictions
Schreiber and Zimmermann 2002:132-4			*				
Uerpmann 1987		p30/37			p19		
Uerpmann 1991		p29	p29	p19			
Ur 2010:409							*
Vila 1998	p132 U			p144	p144	p145-8	
Vila 2006	p102/116 D				p113	p103-8	
Vila 2014:426/433-4	*		*	*			
Way 2011:104					*		
Yilmaz:2012:17/39		*					
Zarins 1978						p16	p17
Zarins 1986	p188 U				p178	p179/188	p188
Zarins 2014	p14/45-7/65-7 U			p36		p67-9/202	p17-32/149
Zeder 1986:407						*	
Zeder 1998					p57	p57-62	
Zeuner 1963:367	* D						

(i) See APP II.9 for physiological adaptation of donkeys

HORSES IN MESOPOTAMIA	Replaced onager for hybridising 2nd m BC	Native to C Asian steppes; then adopted in ANE	Text/ iconog-raphic evidence in ANE from 3rd m BC	Rare in ANE until 2nd m BC
Anthony 1991:250		*		
Anthony 2007:413			*	
Anthony and Brown 2000		p75	p102	
Bökönyi 1991:123		*		
Brownrigg 2006:165			*	
Davis 1980:290		*		
Gates 1988:93				*
Gilbert 1991:104-6		*		
Greenfield 2006:221		*		
Grigson 1993:646			*	
Jans and Bretschneider 1998:157			*	
Jansen 2002:10910		*		
Kelekna 2009		p42	p41-43	
Kohl 1987:27		*		
Kuzmina 2003:208-14		*		
Levine 1999b:9		*		
Littauer and Crouwel 1979:26/41			*	
Milevski 2011:178		*		*
Moorey 1970	p38		p36	
Oates 2003		p117	p115-118	
Olsen 2006:94-5		*		
Owen 1991:260				*
Postgate 1986	p195			p194-198
Potts 2014:643-5			*	
Sherratt 1997c:216			*	
Uerpmann 1987:16/142		*		

HORSES IN MESOPOTAMIA	Replaced onager for hybridising 2nd m BC	Native to C Asian steppes; then adopted in ANE	Text/ iconog-raphic evidence in ANE from 3rd m BC	Rare in ANE until 2nd m BC
Vila 2006:119		*		
Vilà *et al.* 2001:477		*		
Wapnish 1997:335			*	
Zarins 1978:4			*	
Zarins 1986:187	*			
Zarins 2014:203			* (ii)	
Zeder 1986:406	*			

(ii) Zarins (2014:165) maintains, contra Postgate and others, that the term ANSE LIBIR refers to the horse rather than the donkey

Possible evidence of *Equus hydruntinus* (an extinct equid from the Near East)
Brewer *et al.* 1994:99
Davis 1980:289/306-8
Epstein 1984:176
Geigl and Grange 2012:89-96
Sherratt 2003:240
Uerpmann 1987:19
Vila 2006:101

II.44 Issues in zooarchaeological study of working donkeys

ISSUES IN ZOOARCH-AEOLOGICAL STUDY OF WORKING DONKEYS	Exostoses and joint damage in working donkeys	Osteo-arthritis in working donkeys	Osteol. (esp. dental) indicators of constraints on moving/ eating	Evidence of fodder-eating from donkey teeth wear	Evidence of donkey bit-wear	Indications of a lip- or nose-ring	Difficulty in distinguish-ing between eq. species from rmns in antiquity
Alur 1975:411	*						
Baker 1984	p253-4	p253-4	p253-5				
Bartosiewicz *et al.* 1997	p11-2	p12	p11-12				
Clutton-Brock 2001			p336-8	p338	p336		
Clutton-Brock 2003:126					*		
Clutton-Brock 2012:30					*		
Clutton-Brock and Davies 1993	p214-5		p214-5	p215	p214		
Geigl and Grange 2012:90							*
Greenfield *et al.* 2012:23/34							* (i)
Grigson 1995:258/267	*		*				
Levine 1999a:73-4	p74		p73-4				
Littauer and Crouwel 1979:30						*	
Milevski 2011:178							* (i)
Olsen 2006		p93-4	p93				
Rossel *et al.* 2008:3719	*		*				
Russell 2012:228			*				

ISSUES IN ZOOARCH-AEOLOGICAL STUDY OF WORKING DONKEYS	Exostoses and joint damage in working donkeys	Osteo-arthritis in working donkeys	Osteol. (esp. dental) indicators of constraints on moving/ eating	Evidence of fodder-eating from donkey teeth wear	Evidence of donkey bit-wear	Indications of a lip- or nose-ring	Difficulty in distinguish-ing between eq. species from rmns in antiquity
Shackelford *et al.* 2013:4170-71			*				
Shai *et al.* 2016:11			*				
Uerpmann 1991:15			*				
Vila 2014:430							* (i)
Weber 1997:137							*
Weber 2008			p501	p501		p501-5	
Zarins 2014			p42			p138	p17

(i) Dental analysis is most successful