Elands under intensive husbandry: fattening and meat quality in comparison to cattle

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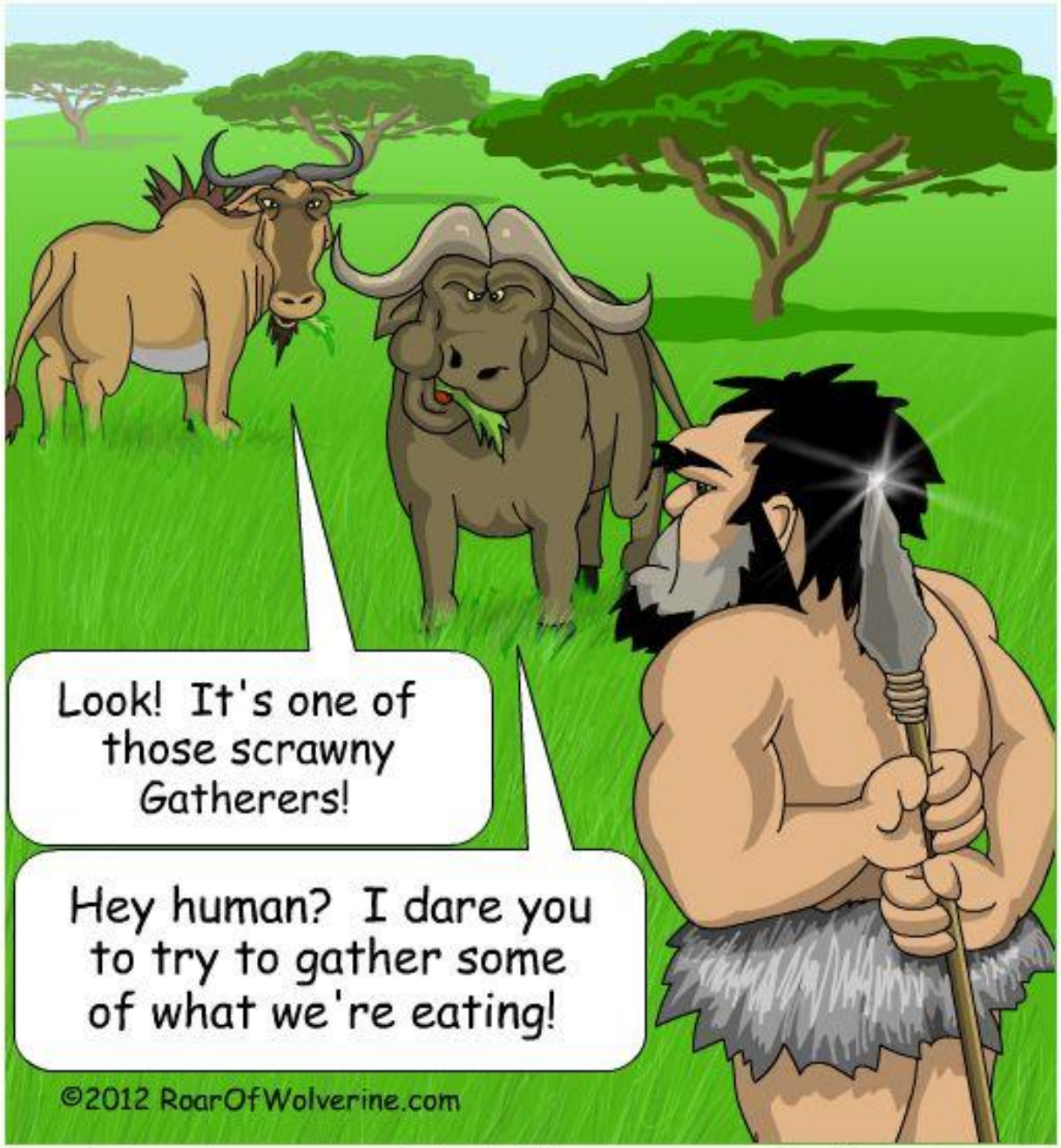
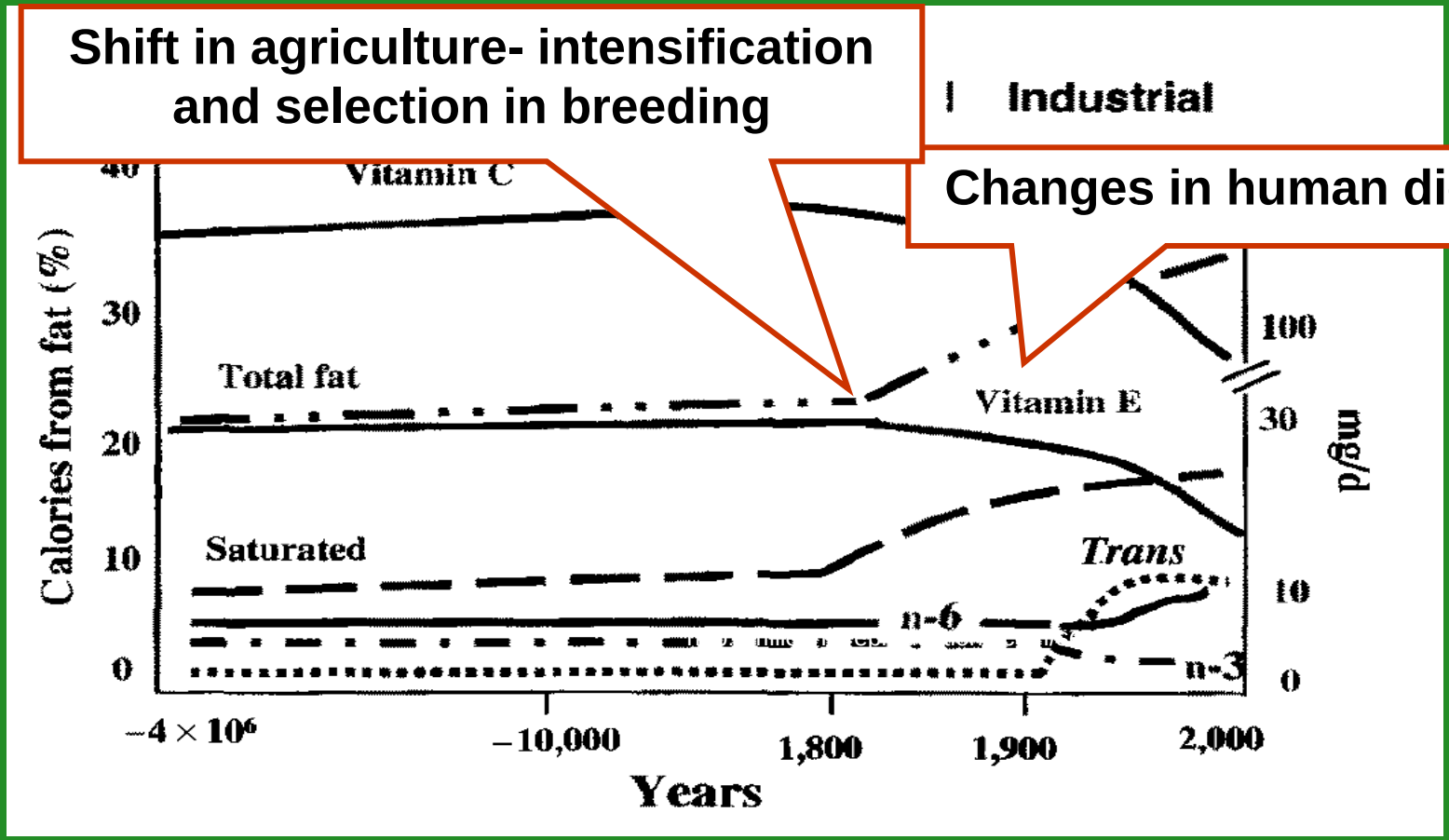


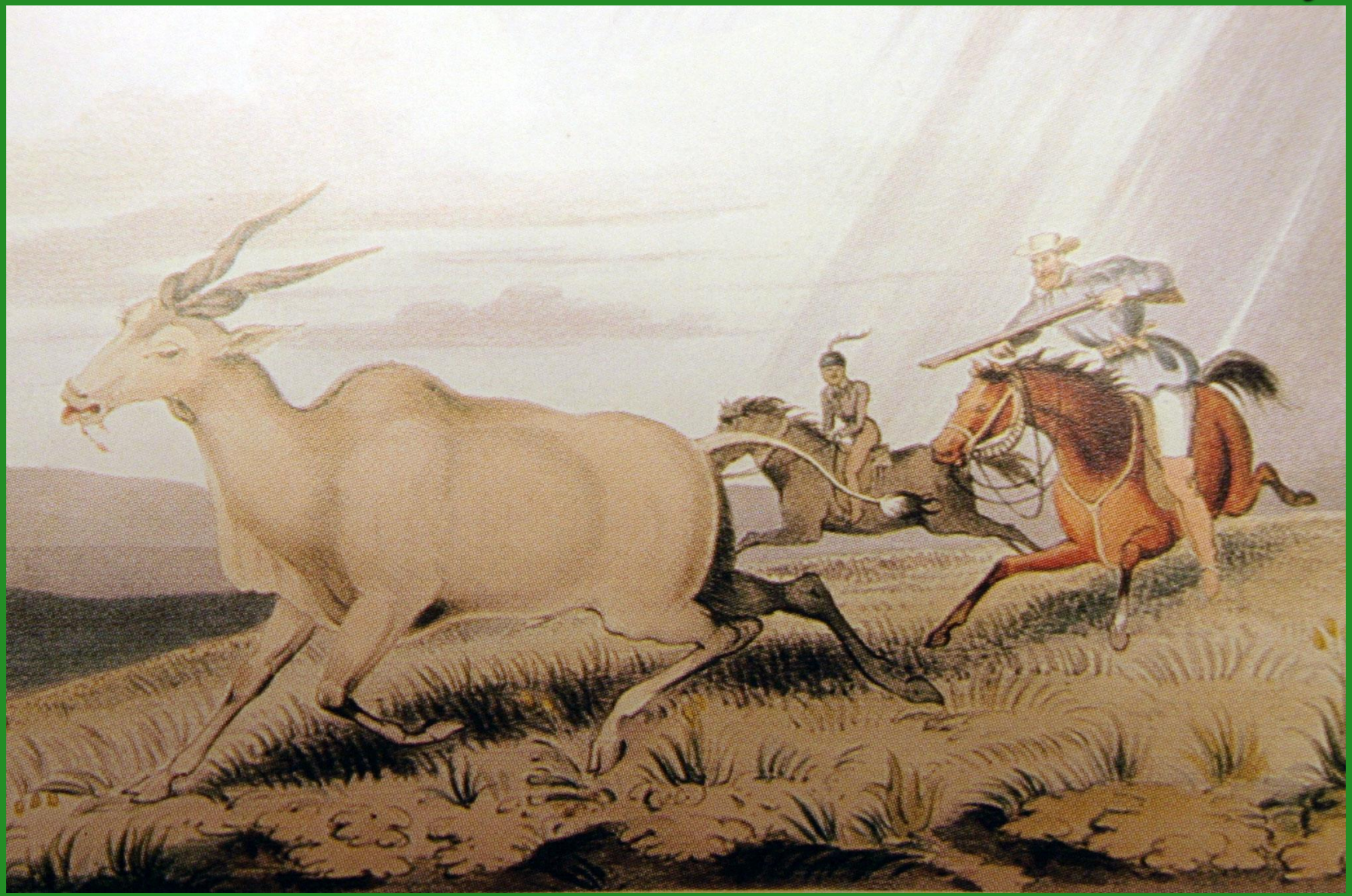
The day we added Hunter to Gatherer

Why wild animals were in scope of humans?
Antlers, horns, bones to produce tools ….



and important part of human diet (Simopoulos, 1999)

Eland conservation in Africa- hunting has became an entertainment in 19th century…

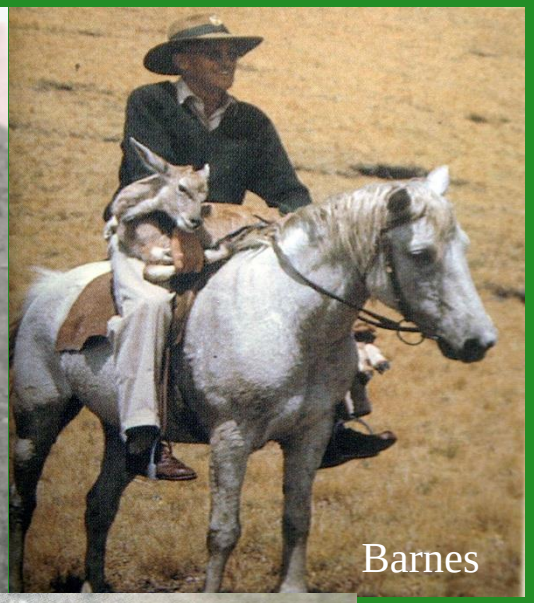


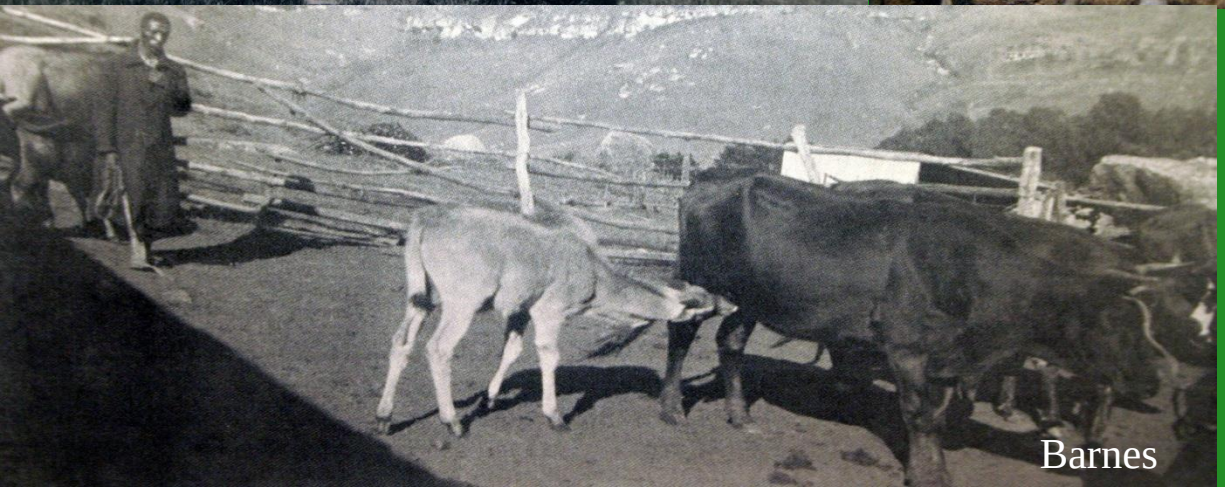
Butler, 19th century.

… and commercial activity.

photo: Mentzel

Rapid decline of big mammals not only at territory of intensive agriculture during 19th and 20th centuries.

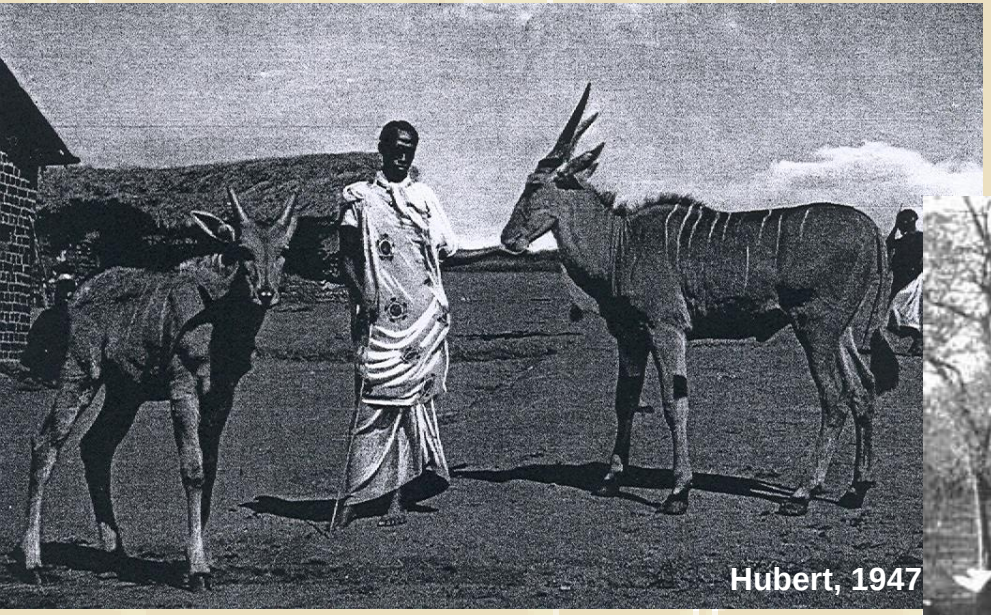




Captive breeding supportive to restoration of wild populations.

History of eland domestication

- ✓ Several attempts after 1900 in East and South Africa, but any lasted long (Carles et al 1981; Field 1974; Lightfoot 1977; Posselt 1963; Retief 1971; Roth 1970; Skinner 1967).

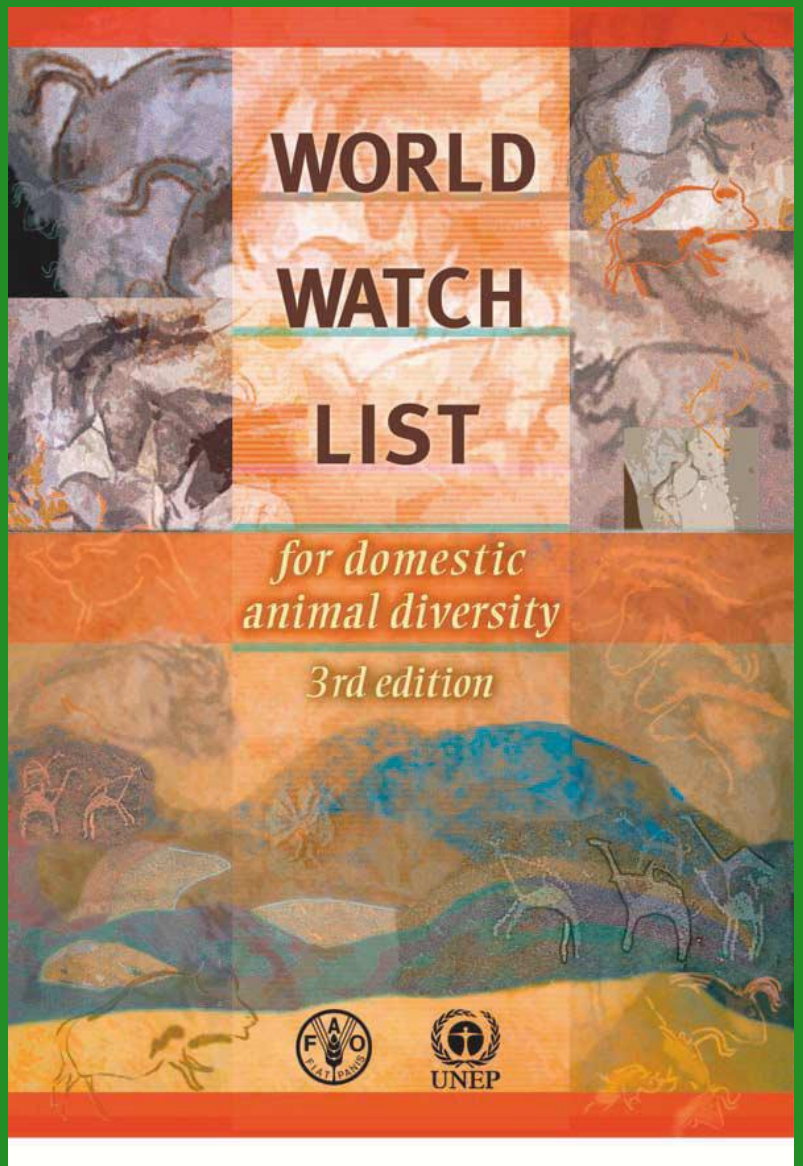

Hubert, 1947


FAO.org

History of eland domestication

✓ 1892 husbandry and domestication has started at territory of southern Ukraine/Russia (Treus a Kravchenko, 1968).

Eland recommended for domestication together with oryx (Scherf, 2000)



Order *Artiodactyla*/Family *Bovidae*

1 Eland	5 Duikers
2 Oryx	6 Blackbuck
3 Springbok	7 Nilgai
4 Impala	8 Saiga

The ranching of wild antelopes is now well established in eastern and southern Africa, often in association with domestic cattle.

1 ELAND

Taurotragus oryx — *NOT THREATENED*

This large antelope is probably the most suitable African species for experimental domestication.

DISTRIBUTION AND CURRENT STATUS

The wild eland is widespread throughout the savannahs of eastern and southern Africa. It occurs in herds of up to 200 and is not at present threatened.

THREATS TO SURVIVAL

The main threats are overhunting, competition with domestic stock and disease transmission, particularly Rinderpest, by cattle.

CAPTIVE BREEDING

Eland breed freely in captivity.

DOMESTICATION AND ECONOMIC IMPORTANCE

There are small herds of domesticated eland in the Ukraine, Kenya, Zimbabwe and Nyae Nyae Farmers Cooperative in Bushmanland, Namibia. A very important, and to some extent successful, attempt at domesticating the eland is being made at Askanya Nova in the Ukraine. Here a large herd of eland, all descended from four bulls and four cows brought from Africa in 1892, is being selected for improvements in the quality of the meat and the quantity of milk production. The milk from about 50 milking eland cows is used in a local hospital for the treatment of gastric disorders and tuberculosis. In 1991, Askanya Nova was still very active in developing its herd of domesticated eland. In Africa, eland are generally kept on ranches for their very popular meat or as hunting trophies.

REMARKS

For further information see Kyle (1972) and Posselt (1963).

Other antelopes of interest for domestication:

Photo 3.20: Eland (Tanzania). This large antelope is the most suitable African species for domestication.

There are a number of other African and Asian antelopes which may have potential for domestication or semi-domestication. These come from diverse habitats ranging from moist rain forest to arid savannah and semi-desert. They are thus adapted to some environmental conditions that are marginal for the production of conventional livestock because of drought, heat, disease, altitude, humidity and other constraints. Even if not subjected to the long process of domestication they may well prove to be more productive and less damaging to the environment than conventional livestock in marginal areas, once practical and sustainable management regimes have been developed. With the exception of the Saiga antelope, none of these animals are currently threatened with extinction. The animals concerned are:

2 ORYX

Oryx spp. — *Eastern Africa*

Two species, *O. beisa* and *O. callotis*, occur in Kenya and Tanzania and another, the gemsbok, *O. gazzella*, in South Africa, Botswana and Namibia. *O. callotis* has been experimentally herded on the Galana Ranch in eastern Kenya where the meat has been sold at premium prices to hotels on the Kenya Coast. Thresher (1981) described the economics of this attempt to domesticate the oryx.

Photo 3.21: Oryx. An east African antelope undergoing domestication in Kenya.

Intensive production

Not found recently in Africa

How it is in temperate central European climate under ‚feedlot‘ fattening?

Distribution of eland:

(Redrawn from IAE, 1998)

3 subspecies:

Taurotragus oryx pattersonianus

Taurotragus oryx livingstonii

Taurotragus oryx oryx

ELAND HUSBANDRY AT CULS

1969- 1971 the first elands were transported from E Kenya to ZOO Dvůr Králové

2000 FTA CULS bought 5 elands from ZOO Dvůr Králové as supportive to partner project conservation of Western Derby eland (*Taurotragus derbianus derbianus*)

2006 CULS built new University farm at Lány

GOALS OF ELAND HUSBANDRY AT CULS

To evaluate the farming technology from an animal welfare perspective and raise this species for meat production in the Czech Republic.

To educate and train students of CULS in breeding techniques, to continue with scientific research and to apply knowledge in semi captive breeding programme of Western Derby eland in Senegal.

DERBIANUS
CONSERVATION

www.derbianus.com

Breeding technology

Life history data for each animal-

evidence through ear tagging since early ontogeny

As much as natural condition for breeding and artificial in case of orphaned calves

Hora, 2009

Feeding- animals can graze from Spring to Autumn

They eradicated pasture weed:
- broad leaved dock
- perennial nettle
- creeping thistle

Whole year feeding by balanced feed mixed ratio inside the barn- deep bedding stall technology

Feed is based on:

corn silage (52.1%), lucerne haylage (26%), meadow hay (10.4%), straw (10.4%) and minerals (1%).

Moreover, they have meadow hay *ad libitum*

Health and antiparasitical treatment- rarely used

Preventive Veterinary Medicine 121 (2015) 265–272

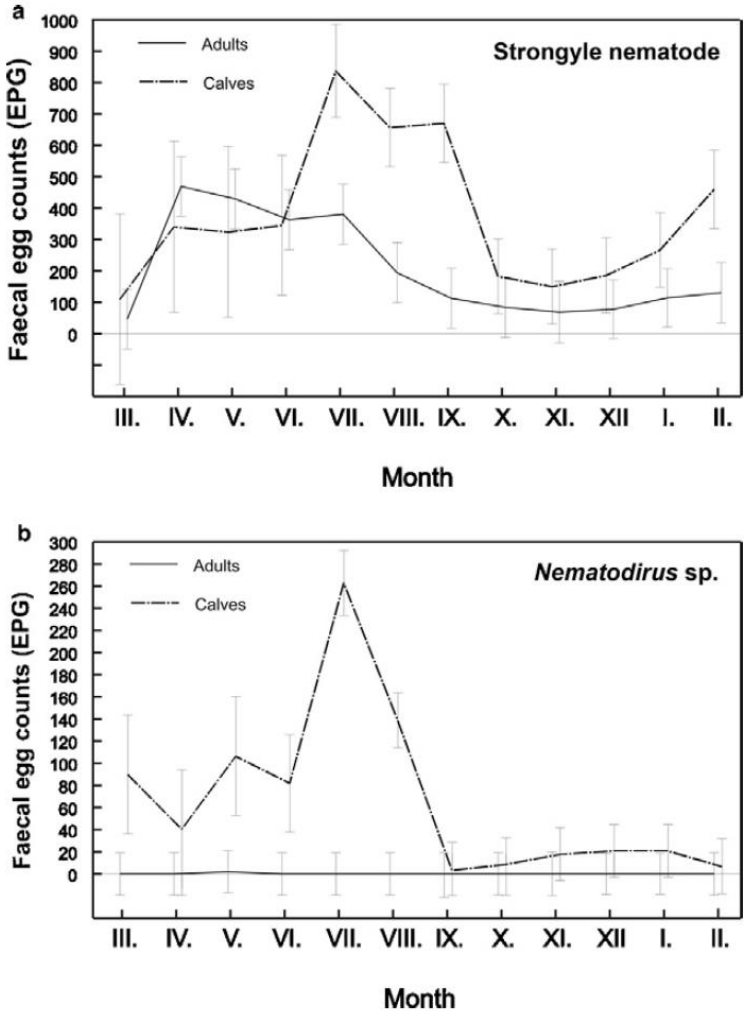
Contents lists available at ScienceDirect

Preventive Veterinary Medicine

journal homepage: www.elsevier.com/locate/prevetmed

Effects of age, sex, lactation and social dominance on faecal egg count patterns of gastrointestinal nematodes in farmed eland (*Taurotragus oryx*)

J. Vadlejch[a,*], R. Kotrba[b], Z. Čadková[a], A. Růžičková[b], I. Langrová[a]



Age has effect on parasitic load

Fig. 3. (a) Seasonal fluctuations in strongyle-type eggs (standard deviation included) shed through calf and adult eland faeces during a twelve month survey. (b) Seasonal fluctuations in *Nematodirus* sp. eggs (standard deviation included) shed through calf and adult eland faeces during a twelve month survey.

Parasitic load influenced by lactation and rank

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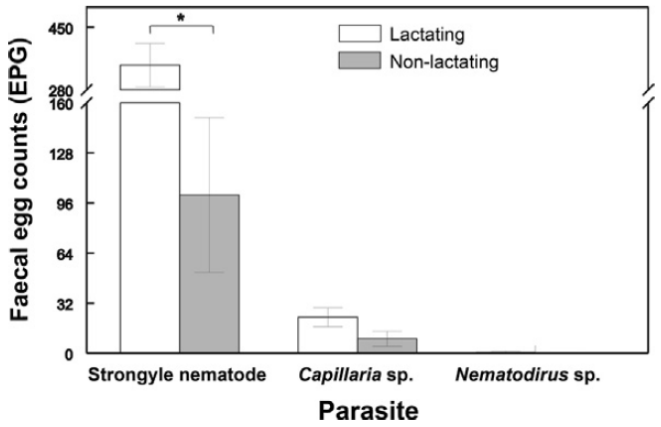


Fig. 4. Effect of lactation on the intensity of infection caused by the monitored nematodes. The asterisk indicates statistically significant differences ($P < 0.0001$) between lactating females and their non-lactating counterparts.

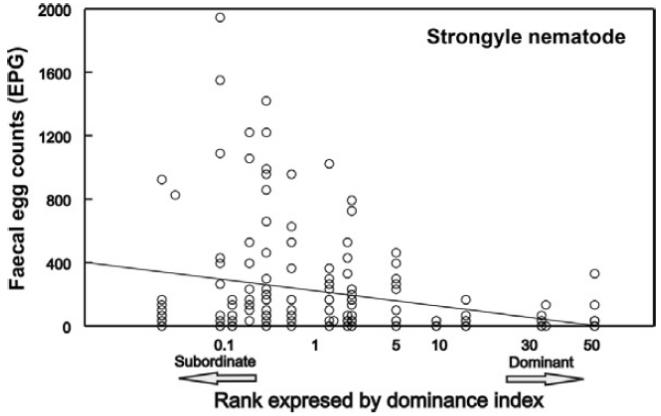


Fig. 5. Association between intensity of infection caused by strongyle nematodes and adult eland (both sexes) social rank over a one year survey. Rank remained stable for particular animal during the year.

Meat of free ranging eland …

…is highly valued f… cs (Lambrecht, 1983).

… contain less tha… g of meat (Hoffman et al, 2… ; Von la Chevallerie, 1972).

… has a higher amount of unsaturated fatty acids than beef (Crawford, 1975).

What about eland under feedlot fattening?

Methods- comparison to cattle

Animals:

6 eland bulls and 6 bulls of Czech Fleckvieh cattle

Feeding:

Eland- corn silage, Lucerne haylage, Lucerne hay, straw and mineral supplements (*ad libitum*)

Cattle- corn silage, Lucerne haylage, Lucerne hay plus concentrares (wheat and oat groat, soybean meal), straw and mineral supplements (*ad libitum*)

Slaughter:

Eland- by free bullet at farm and processed in slaughter house

Cattle- in slaughter house

Slaughter is done by rifle at farm and processed in abattoir under veterinary inspection

Methods

Weight:

Live- before slaughter after 18 h of fasting.

Separable fats and sides- after slaughter.

Meat parts, bones and tendons- 24 h after slaughter from chilled right side.

Chemical composition- from ***Musculus longisimus lumborum***

Physical properties- from ***Musculus longisimus lumborum***

Statistics:

SAS 9.1., GLM- diferences between cattle and eland in traits evaluated by Tukey- Kramer adjustment.

Results I.

Slaughter traits

Trait	Cattle LSM	Eland LSM	*SEM*	Significance
Slaughter age (days)	457.8	1111.8	41.38	<0.0001
Slaughter weight (kg)	573.0	414.2	18.93	<0.0001
Daily gain (kg/day)	1.18	0.35	0.025	<0.0001
Carcass gain (kg/day)	0.69	0.20	0.012	<0.0001
Hot carcass weight (kg)	316.0	226.3	14.68	0.0015
Dressing percentage (%)	55.12	54.29	1.03	0.5796
Conformation*	8.0	3.5	0.40	<0.0001
Fatness**	4.8	3.5	0.27	0.0056

* (1 – 18, S^+ best = 18, P^- poorest = 1)

** (1-15, 5^+ fatest = 15, 1^- leanest = 1)

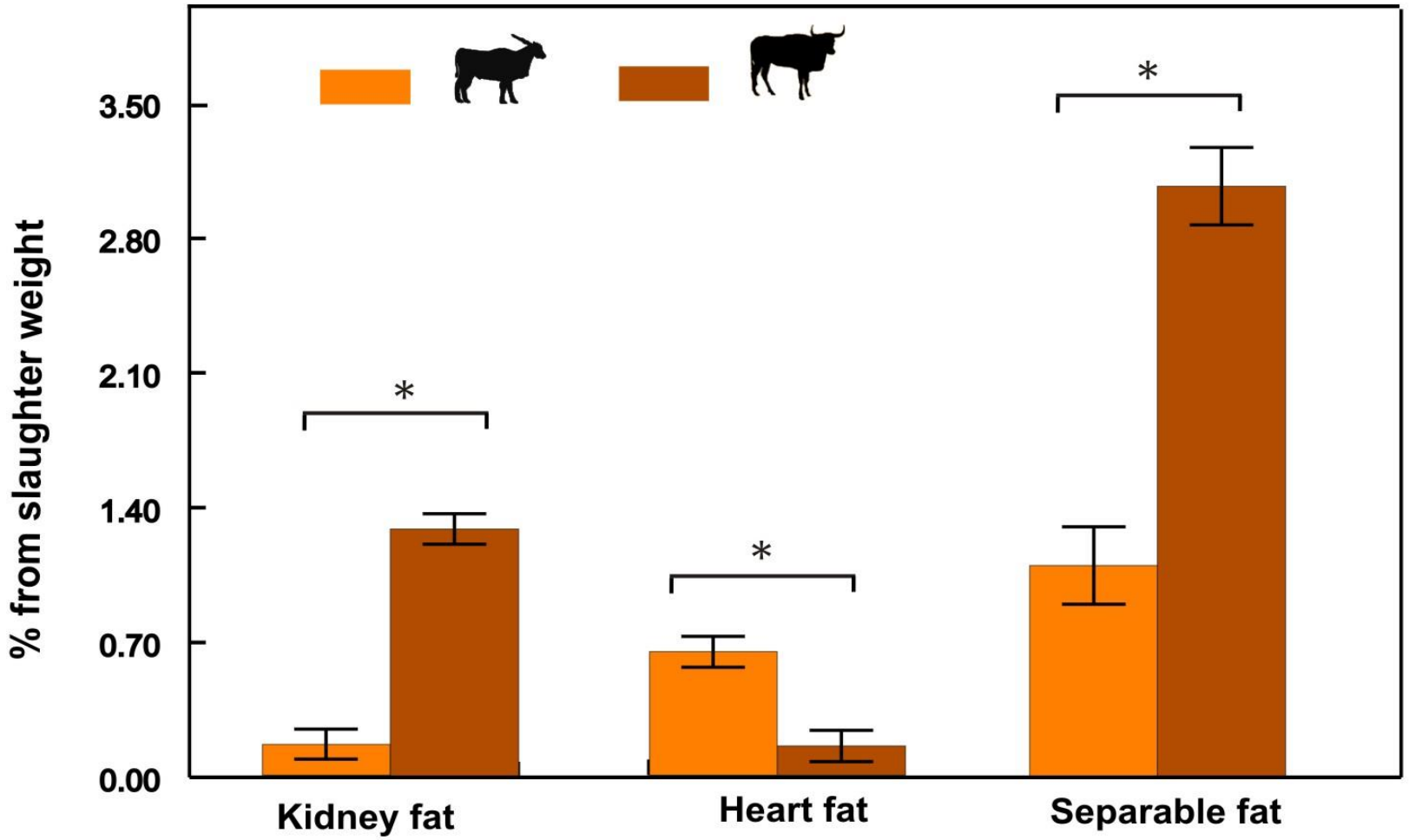
Results II.

Slaughter traits

Trait (% slaughter weight)	Cattle LSM	Eland LSM	*SEM*	Significance
Skin	8.73	7.88	0.302	0.0773
Head	3.04	4.44	0.110	<0.0001
Toungue	0.26	0.17	0.001	<0.0001
Heart	0.39	0.44	0.018	0.1347
Penis	0.22	0.11	0.010	<0.0001
Testicles	0.14	0.07	0.009	0.0006
Tail	0.25	0.15	0.010	<0.0001
Feet	1.94	2.02	0.054	0.2796
Lungs and trachea	1.03	0.95	0.050	0.3054
Liver	1.23	1.06	0.038	0.0106
Kidneys	0.21	0.18	0.008	0.0392
Spleen	0.21	0.14	0.015	0.0101
Rumen and reticulum	1.56	1.83	0.055	0.0051
Intestine	4.14	5.20	0.220	0.0066

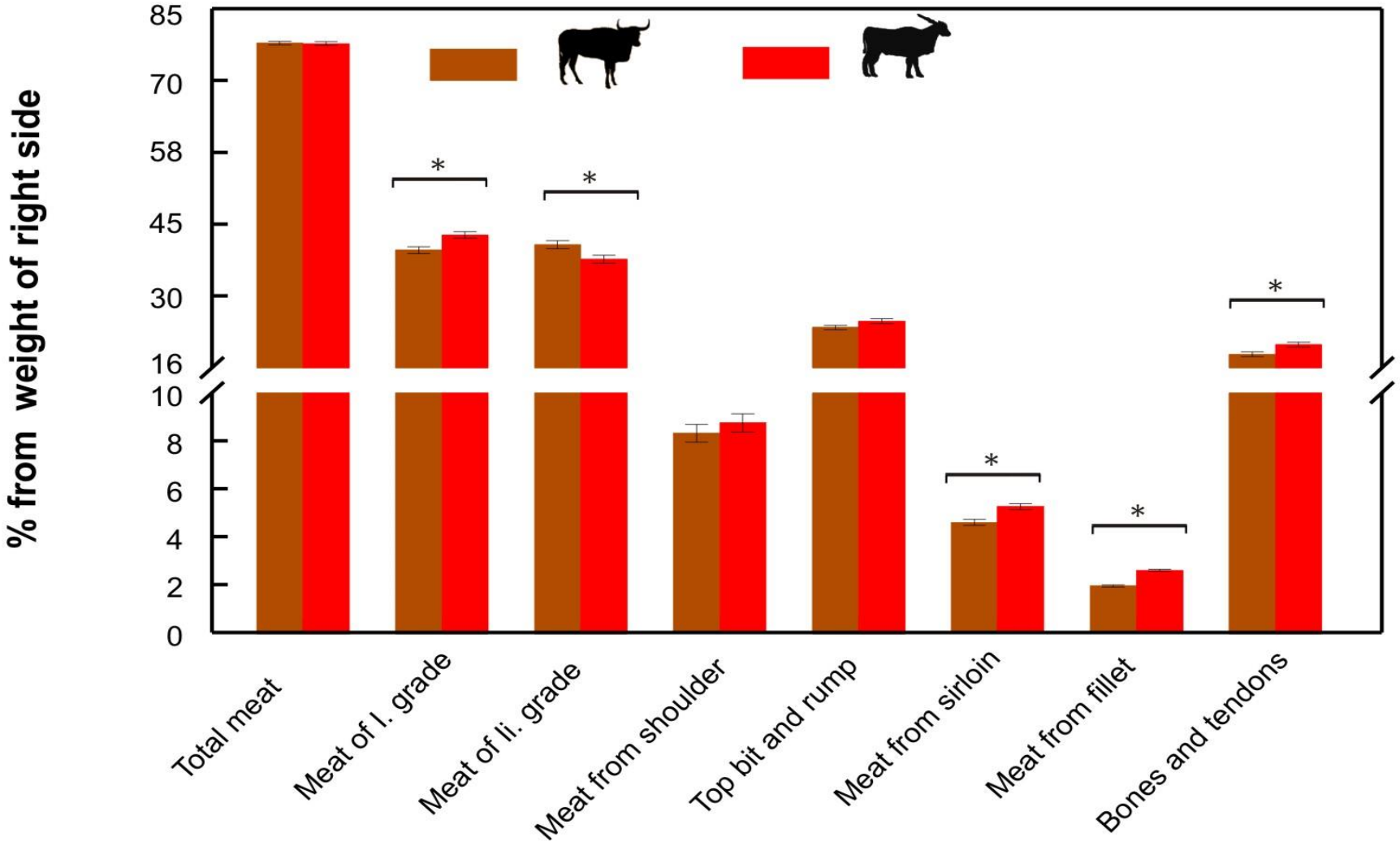
Results III.

Internal fat depots



Results IV.

Carcass composition



Meat Science 96 (2014) 346–352

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Meat Science

journal homepage: www.elsevier.com/locate/meatsci

Comparison of meat quality between eland (*Taurotragus oryx*) and cattle (*Bos taurus*) raised under similar conditions

Luděk Bartoň [a], Daniel Bureš [a], Radim Kotrba [b,c,*], James Sales [d]

Item	Eland ($n = 6$)	Cattle ($n = 6$)	SEM	P-value
	LSM	LSM		
Physical characteristics				
pH_{24}	5.71	5.55	0.035	0.010
Colour				
Lightness, L^*	36.3	41.0	1.51	0.050
Redness, a^*	11.6	12.9	0.65	0.200
Yellowness, b^*	10.2	12.6	0.69	0.039
Drip loss (g/kg)	12.4	12.0	1.57	0.884
Chemical composition (g/kg muscle)				
Dry matter	243.7	248.6	2.17	0.137
Protein	218.5	214.8	3.23	0.435
Crude fat	2.00	14.1	1.777	<0.001
Cholesterol	0.53	0.62	0.046	0.114
Total collagen	2.85	3.66	0.175	0.009

Fatty acids

Fatty acid	Proportions			
	Eland ($n = 6$)	Cattle ($n = 6$)		
	LSM	LSM	SEM	P-value
$\sum$ SFA[b]	41.80	47.90	0.68	<0.001
$\sum$ MUFA[c]	25.10	32.60	0.74	<0.001
$\sum$ PUFA[d]	25.10	12.70	0.39	<0.001
$\sum n-6$	21.00	10.80	0.36	<0.001
$\sum n-3$	4.20	1.80	0.10	<0.001
$\sum$ PUFA/$\sum$ SFA	0.60	0.27	0.010	<0.001
$\sum$ MUFA/$\sum$ SFA	0.60	0.68	0.024	0.034
$\sum n-6/\sum n-3$	5.04	6.08	0.28	0.026

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… , but scored worse in most parameters

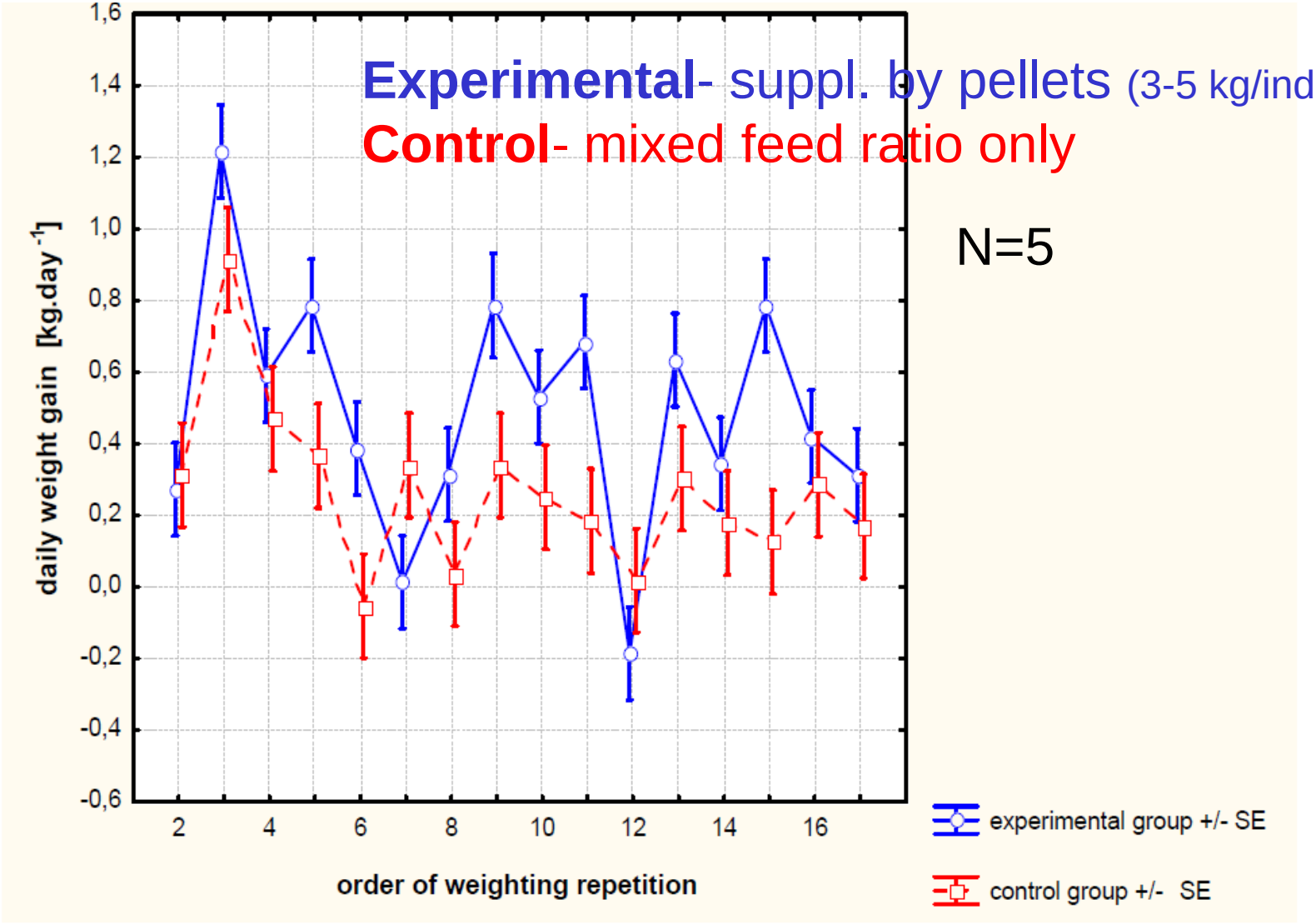
… eland (*Taurotragus oryx*) and cattle … nditions

… c,*, James Sales d

	Eland		Cattle		SEM	P-value	
	3 days ($n = 6$)	14 days ($n = 6$)	3 days ($n = 6$)	14 days ($n = 6$)			
	LSM	LSM	LSM	LSM		Species	Ageing
Sensory							
Tenderness	2.98	4.54	5.61	7.08	0.375	<0.001	<0.001
Chewiness	2.75	4.16	5.84	7.14	0.403	<0.001	<0.001
Fibrosity	3.38	4.48	5.62	6.66	0.294	<0.001	<0.001
Juiciness	4.54	4.97	5.62	6.19	0.350	0.009	0.015
Odour intensity	5.80	5.42	5.75	5.63	0.260	0.714	0.234
Flavour intensity	4.24	4.93	6.14	6.68	0.271	<0.001	<0.001
Overall acceptance	2.86	4.11	6.02	7.12	0.338	<0.001	<0.001
Physical							
WB shear force (N)	76.50	63.17	58.17				
Thawing loss (%)	9.67	11.00	9.50				
Cooking loss (%)	23.00	22.67	24.50				

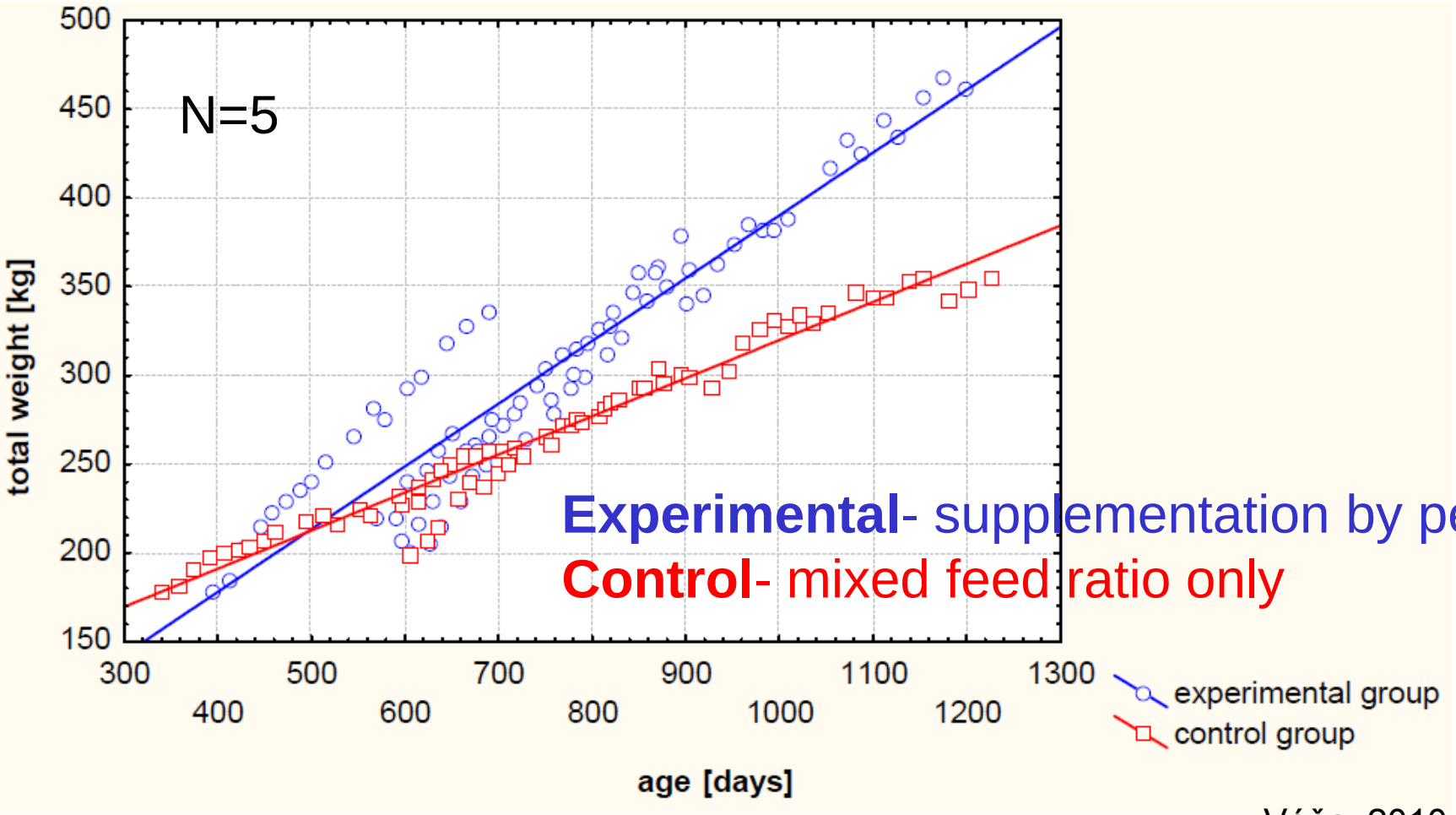
No difference in WB shear force, thawing and cooking loss …

Fattening- influence of enriched diet on growth



Váňa, 2010

Fattening- influence of enriched diet on growth



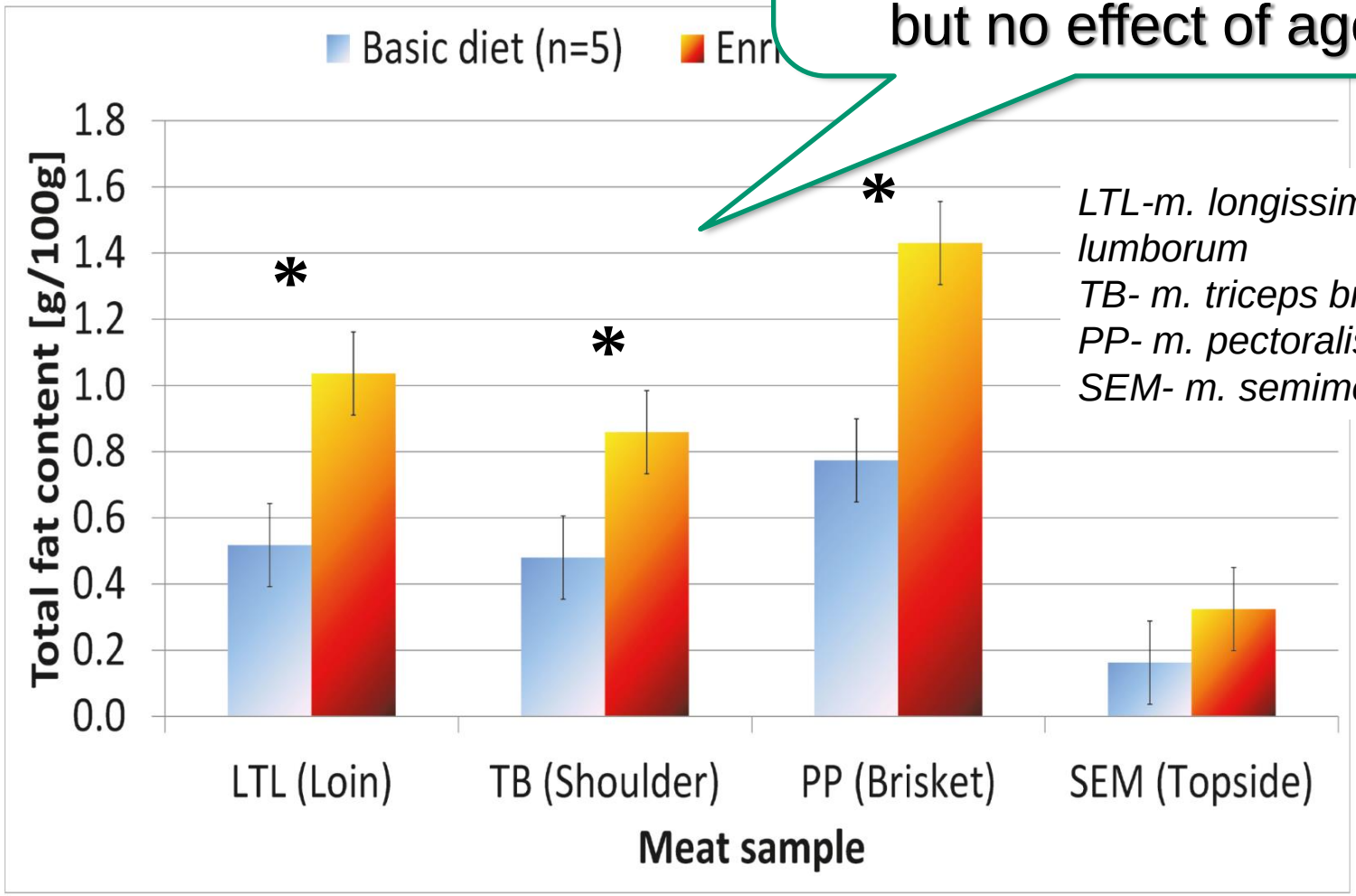
Experimental- supplementation by pellets

Control- mixed feed ratio only

Váňa, 2010

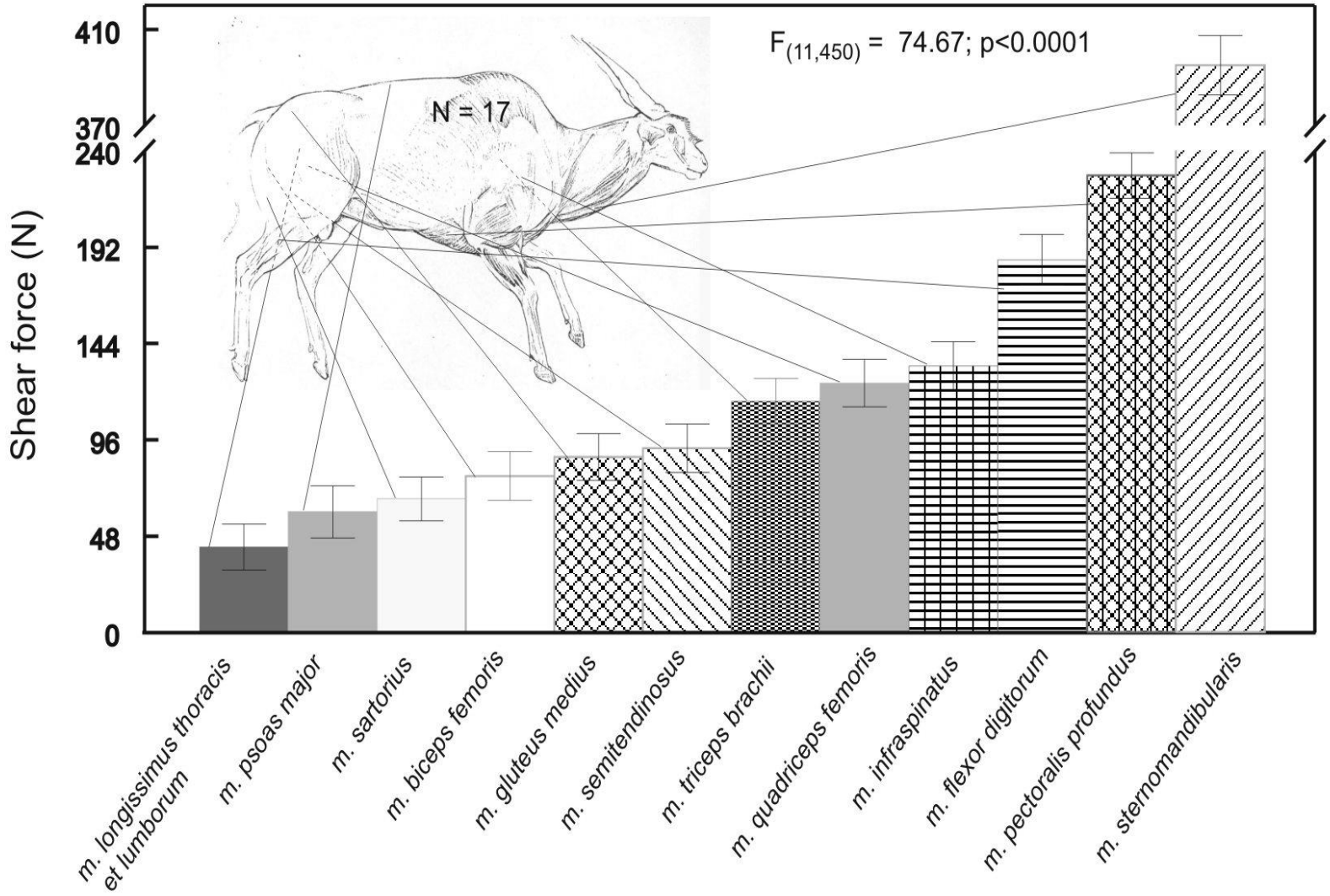
Fattening- influence of enriched diet on mea

… and differences in total colagen and WB shear force between muscles, but no effect of age



LTL-m. longissimus thoracis et lumborum
TB- m. triceps brachii
PP- m. pectoralis profundus
SEM- m. semimembranosus

WB shear force of different muscles



Tendency of age to affect the shear force (p=0.0627), mucsles of younger animals tend to be more tough.

Conclusion

- Good adaptability, manageable under intensive husbandry, but not fully suitable to conventional practice
- Worse fattening performance than cattle, but respond well on enriched diet
- Excellent meat quality even on preserved fodder
- Different meat parameters dependent mainly on muscle type, but not on age of animal (animals between 2-4 years)

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ZOO Praha

ZOO Ostrava

Thank you for your attention…

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