



Department of Animal Science

Mulawarman University

Samarinda, East Kalimantan, INDONESIA

Kerbau Kalang

Sumber Daya genetik Lokal

Suhardi, S.Pt.,MP.,Ph.D

What do you think about buffalo?



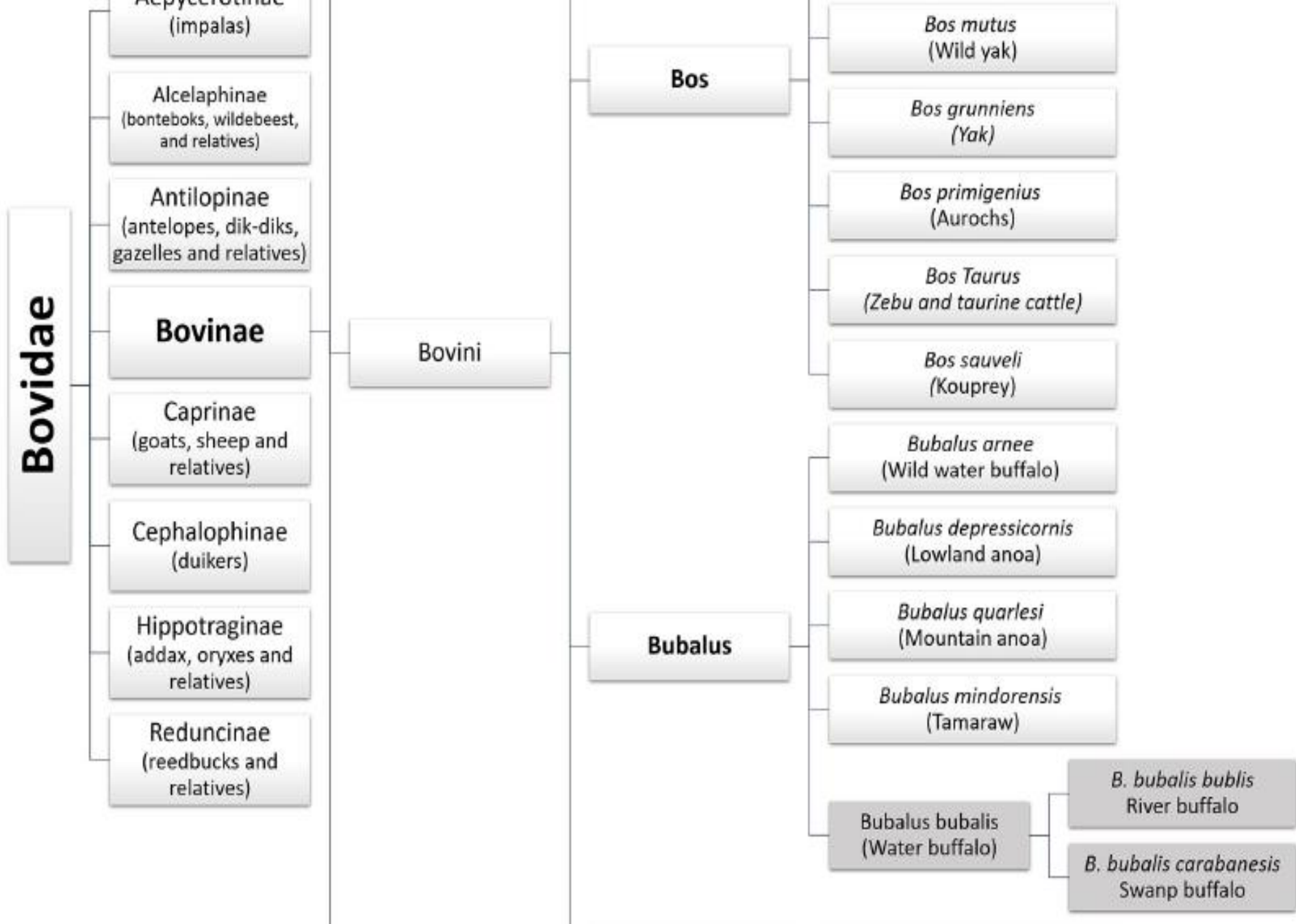
Buffaloes Taxonomy

Taxonomic Hierarchy

Kingdom	Animalia – Animal, animaux, animals
Subkingdom	Bilateria
Infrakingdom	Deuterostomia
Phylum	Chordata – cordés, cordado, chordates
Subphylum	Vertebrata – vertebrado, vertébrés, vertebrates
Infraphylum	Gnathostomata
Superclass	Tetrapoda
Class	Mammalia Linnaeus, 1758 – mammifères, mamífero, mammals
Subclass	Theria Parker and Haswell, 1897
Infraclass	Eutheria Gill, 1872
Order	Artiodactyla Owen, 1848 – artiodactyls, porco do mato, veado, cloven-hoofed ungulates, even-toed ungulates
Family	Bovidae Gray, 1821 – antelopes, cattle, goats, sheep, bovids
Subfamily	Bovinae Gray, 1821
Genus	Bubalus C. H. Smith, 1827 – water buffalos
Species	Bubalus bubalis (Linnaeus, 1758) – water buffalo, water buffalo (feral), Water Buffalo, domestic water buffalo

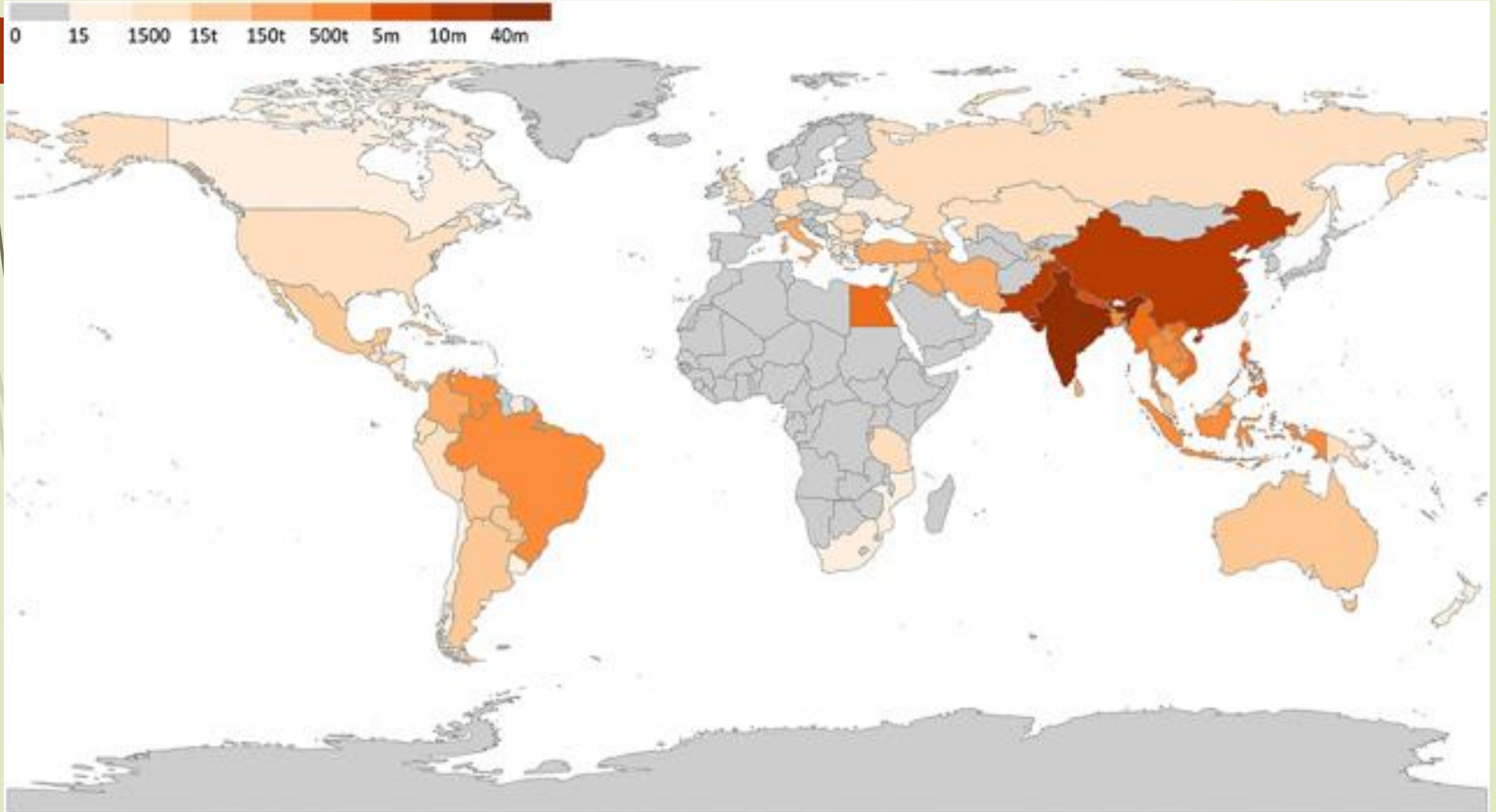
Direct Children:

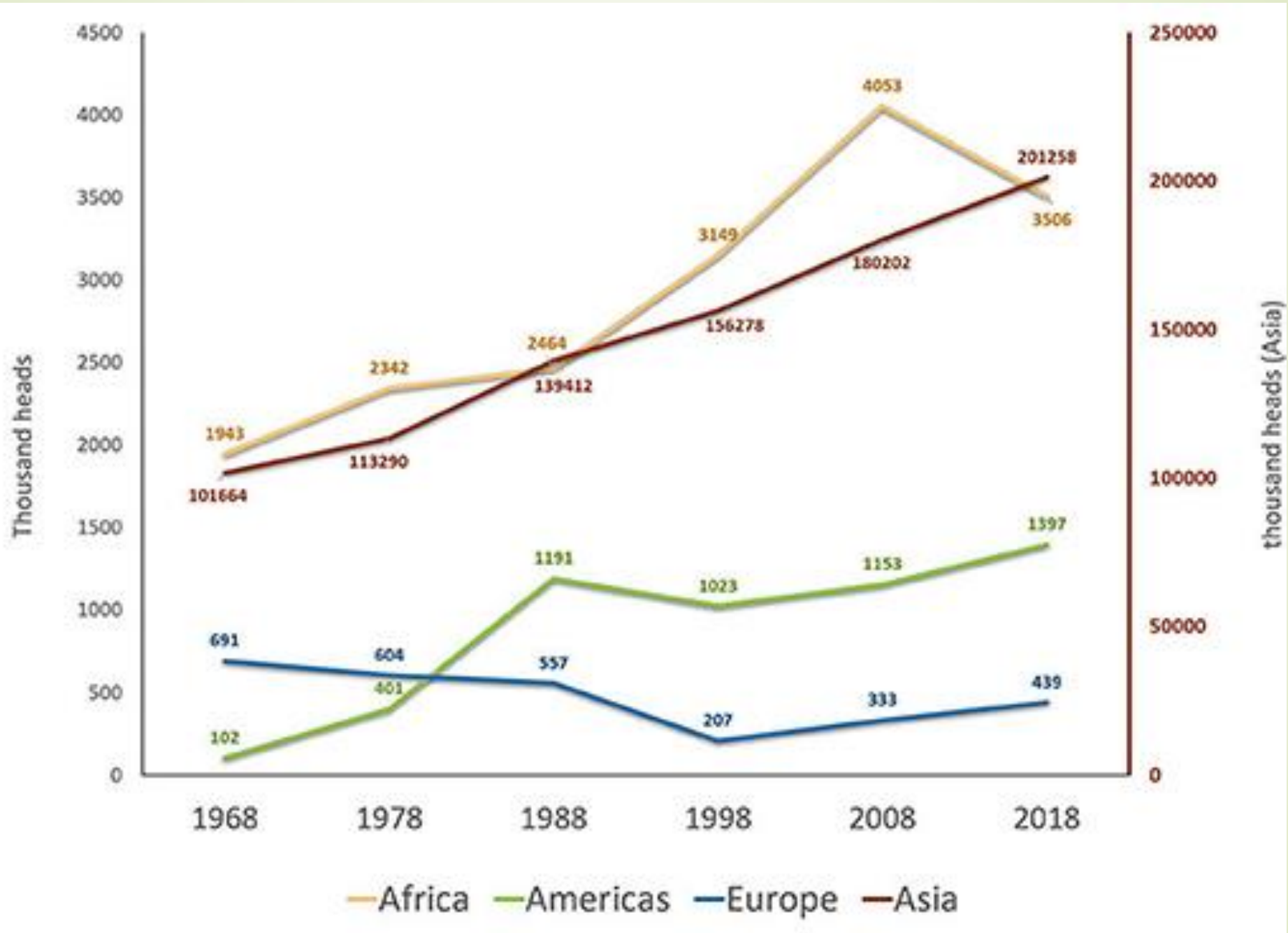
Subspecies	Bubalus bubalis arnee (Kerr, 1792) – Indian water buffalo, arni
Subspecies	Bubalus bubalis bubalis (Linnaeus, 1758)
Subspecies	Bubalus bubalis fulvus (Blanford, 1891)
Subspecies	Bubalus bubalis kerabau Fitzinger, 1860
Subspecies	Bubalus bubalis migona Deraniyagala, 1952
Subspecies	Bubalus bubalis theerapati Groves, 1996



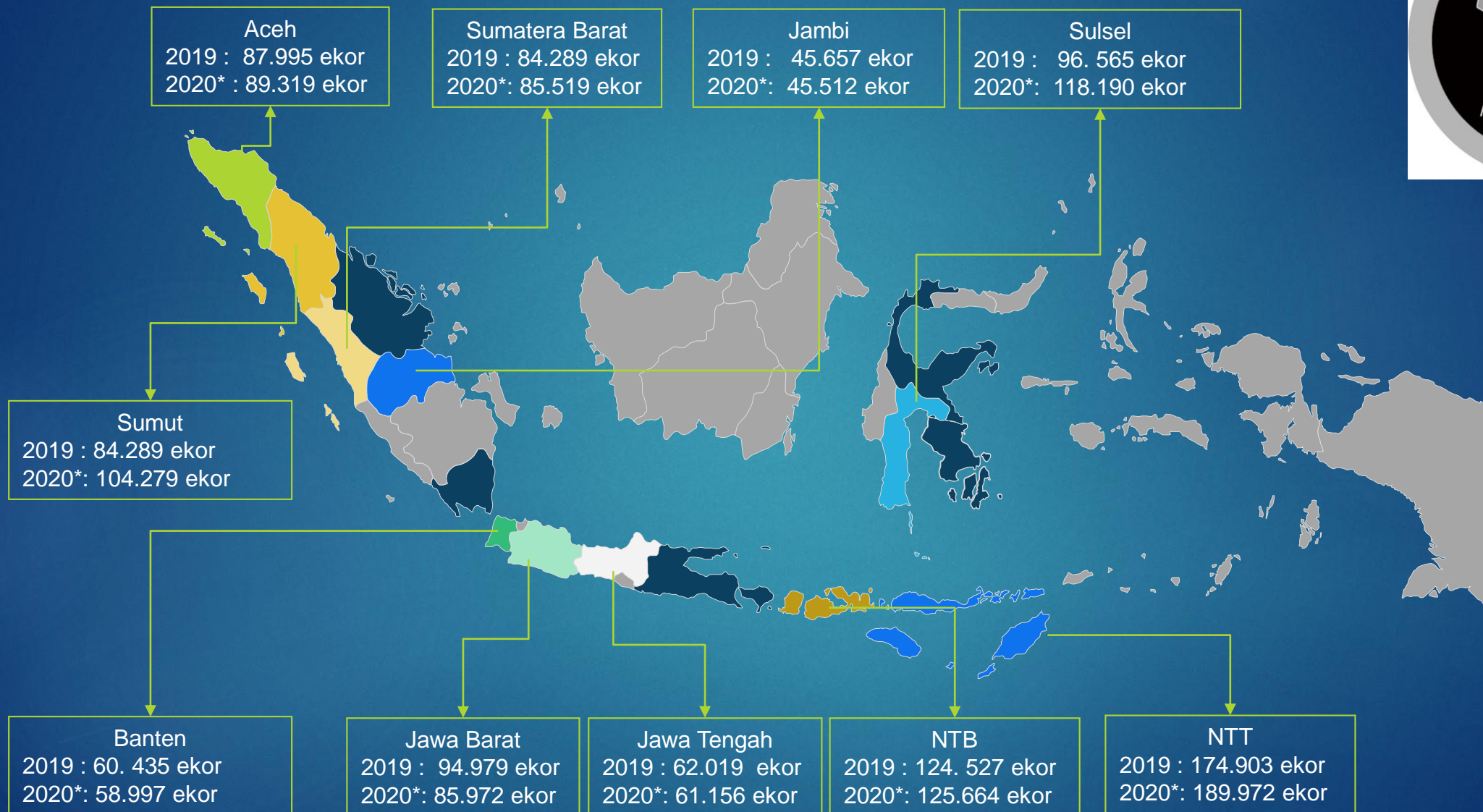
Source: Minervino et al., 2020

Buffalo Distribution in the World





SENTRA POPULASI KERBAU TAHUN 2019-2020



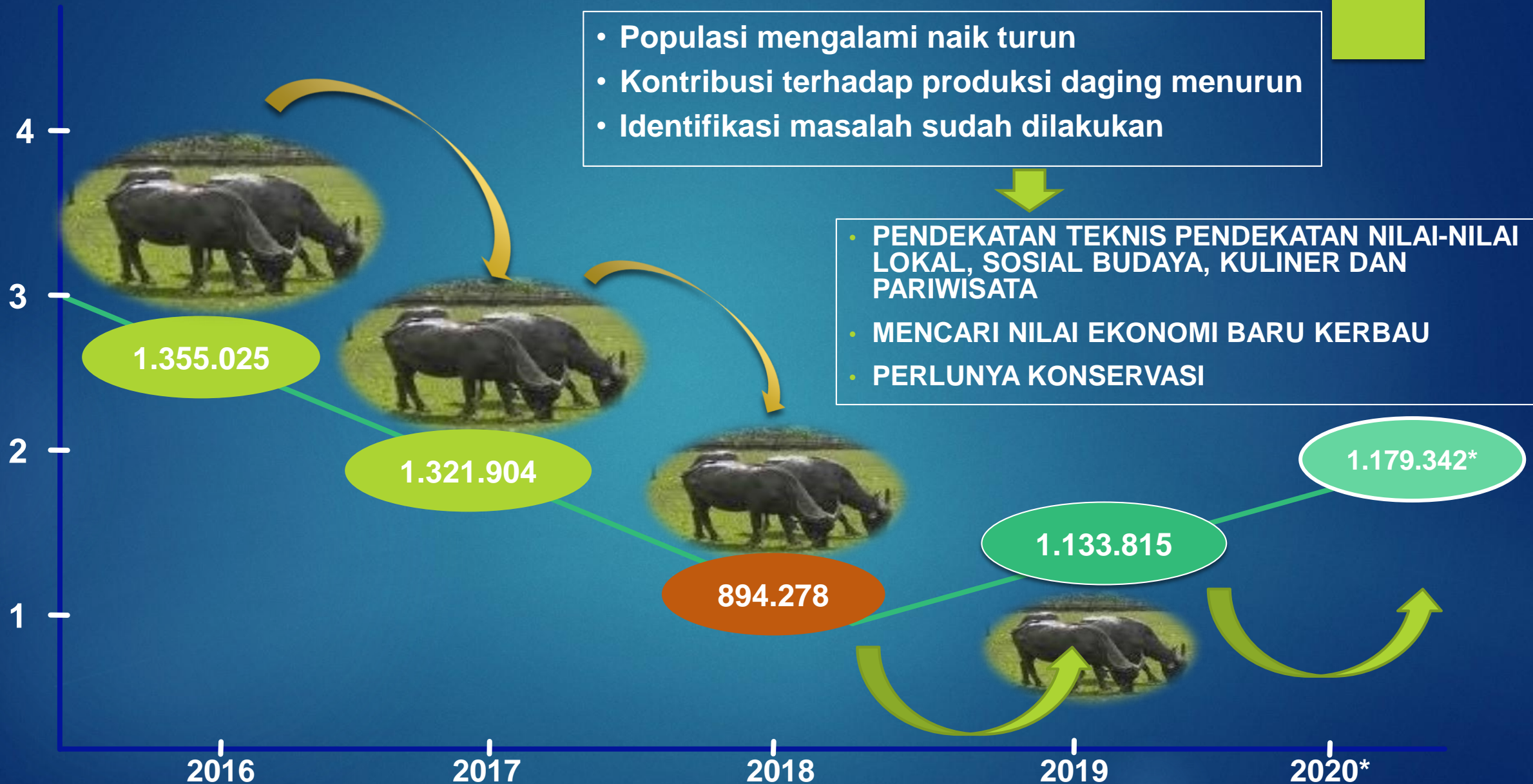
Sumber : Statistik Peternakan Tahun 2020

POPULASI KERBAU

(Sumber : Statistik Ditjen PKH Tahun 2020)

- Populasi mengalami naik turun
- Kontribusi terhadap produksi daging menurun
- Identifikasi masalah sudah dilakukan

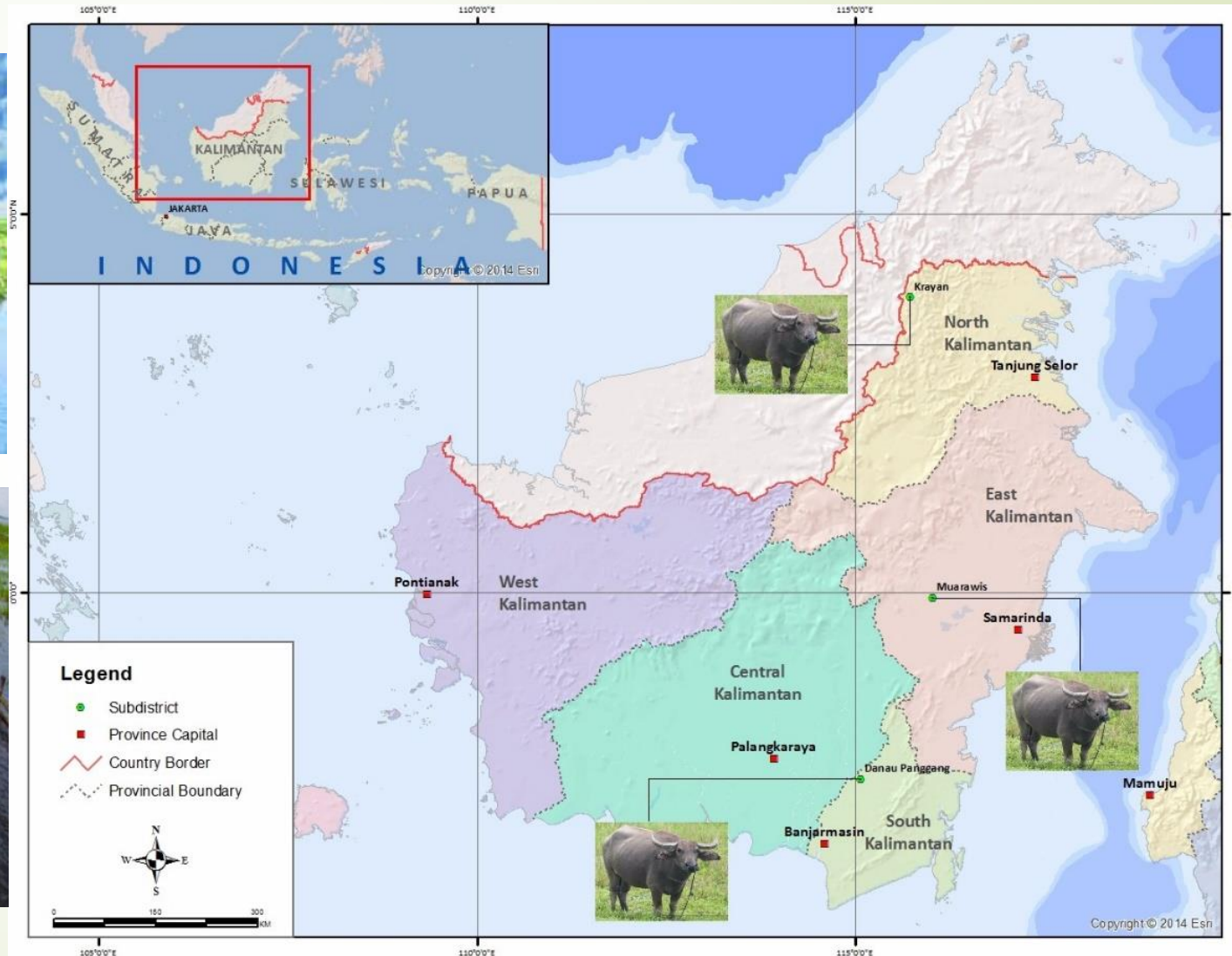
- PENDEKATAN TEKNIS PENDEKATAN NILAI-NILAI LOKAL, SOSIAL BUDAYA, KULINER DAN PARIWISATA
- Mencari nilai ekonomi baru kerbau
- Perlunya konservasi



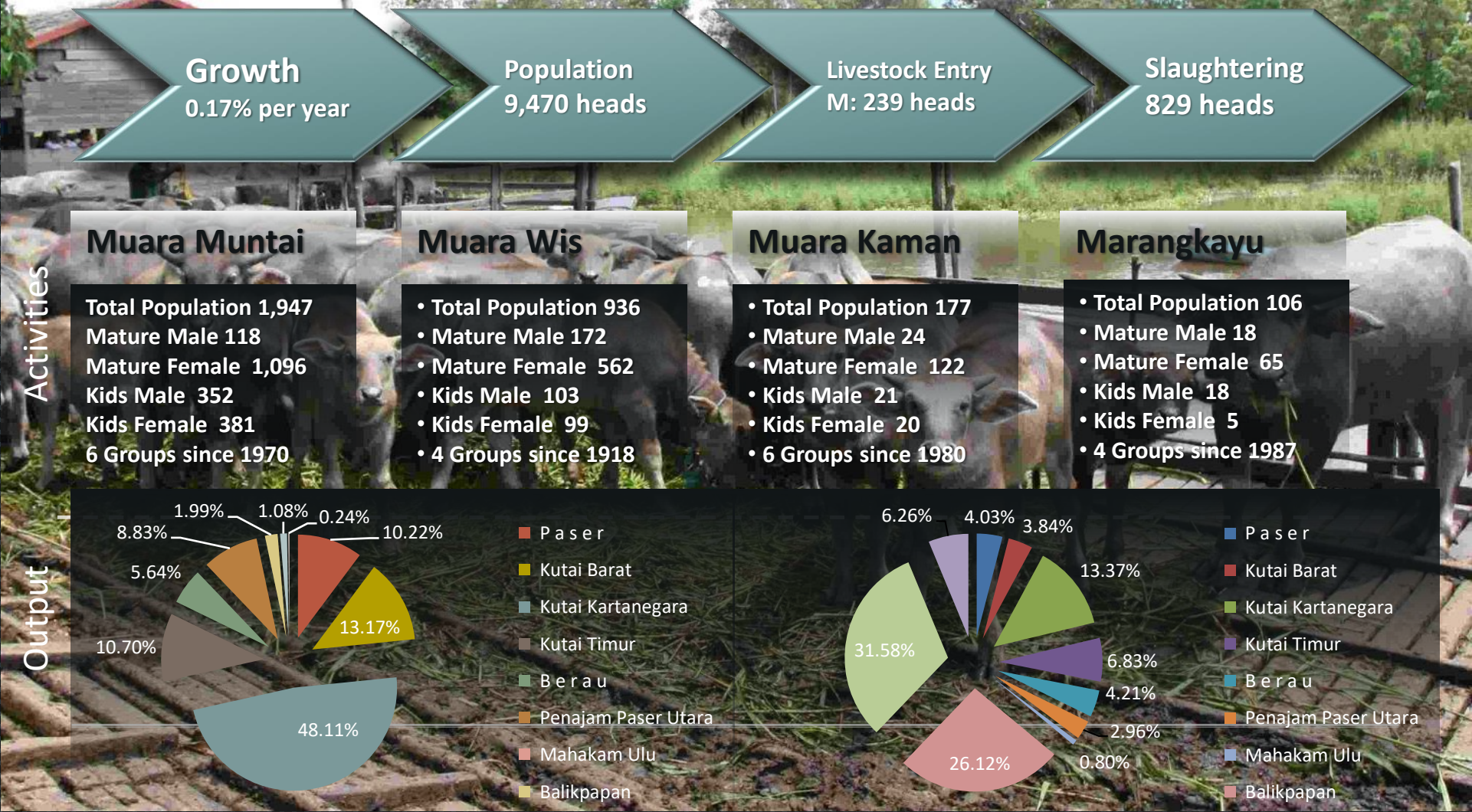
RUMPUN ATAU GALUR YANG TELAH DI TETAPKAN

Komoditas	No Keputusan
Kerbau Sumbawa (NTB)	2910/Kpts/OT.140/6/2011
Kerbau Moa (Maluku)	2911/KPts/OT.140/06/2011
Kerbau Kalang Kalimantan Timur	2843/Kpts/LB.430/8/2012
Kerbau Kalang Kalimantan Selatan	2844/Kpts/LB.430/8/2012
Kerbau Toraya (Sulsel)	2845/Kpts/LB.430/8/2012
Kerbau Pampangan (Sumsel)	694/KPts/PD.410/2/2013
Kerbau Simeulue (Aceh)	579/KPts/SR.120/4/2014
Kerbau Kuntu (Riau)	1053/KPts/SR.120/10/2014
Kerbau Gayo (Aceh)	302/Kpts/SR.120/5/2017
Kerbau Murrah	

Buffaloes have an important role religiously, socially and economically



Buffalo Database in East Kalimantan 2015-2020



The Distribution of Buffalo Livestock Population Percentage by Region

The Distribution of Meat Production Percentage by Region



Buffalo Farm Characteristics

Based on observation at buffalo farming (respondents) were shown the sex ratio 1:4, which are from 351 heads of buffalo consists 63 male and 268 female .



Muara Muntai – East Kalimantan



Muara Wis –East Kalimantan

East Kalimantan province, which has stout lakes, rivers, and swamps, is the original habitat of Kalang Buffalo since hundreds of years ago, and in 2012 Kalang buffalo has been set as genetic resources (plasmanutfah) originally from East Kalimantan province

by Minister of Agriculture Republic of Indonesia No. 2843 / Kpts / LB.430 / 8/2012.

Kalang Buffalo Farming Systems



The production system of the Kalang buffaloes have differences on animal handling and farming system in dry and rainy season/flooding season.

*During dry season, used extensive farming system,
Conversely, for the rainy/flooding season, semi intensive systems were used*



Kalang Buffaloes Habitat



Kalang Cage System



Buffalo Quantitative Description

Table 1. Quantitative description of male and female buffalo based on subpopulation regions

Variables		NK		EK		SK		PT	
		Male	Female	Male	Female	Male	Female	Male	Female
Wither height (cm)	Average	124.38 ^a	122.57 ^a	132.02 ^b	130.00 ^b	136.07 ^c	131.08 ^b	135.05 ^c	139.80 ^d
	SD	5.28	3.35	4.07	3.51	3.18	3.03	3.24	2.70
	CV	4.24	2.74	3.08	2.70	2.34	2.31	2.40	1.93
Body length (cm)	Average	119.13 ^a	117.43 ^a	131.55 ^{bc}	132.87 ^{bcd}	134.53 ^{de}	130.37 ^b	133.95 ^{cd}	137.15 ^e
	SD	4.09	4.28	4.25	6.12	3.31	3.37	3.02	2.19
	CV	3.43	3.65	3.23	4.61	2.46	2.58	2.26	1.59
Heart girth (cm)	Average	170.43 ^a	172.53 ^a	183.28 ^{bcd}	180.18 ^b	186.43 ^{de}	182.12 ^{bc}	185.20 ^{cd}	189.15 ^e
	SD	5.11	4.89	4.16	5.73	3.72	6.51	3.14	2.56
	CV	3.00	2.84	2.27	3.18	2.00	3.58	1.69	1.35
Shoulder width (cm)	Average	38.98 ^a	40.93 ^{ab}	43.25 ^{abc}	42.00 ^{ab}	45.32 ^{bc}	42.33 ^{ab}	45.15 ^{bc}	47.10 ^c
	SD	6.02	12.33	4.33	4.71	3.93	5.47	3.18	3.18
	CV	15.44	30.13	8.67	11.21	8.67	12.93	7.04	6.75
Chest depth (cm)	Average	69.55 ^{ab}	68.23 ^a	71.72 ^b	72.13 ^b	76.53 ^c	72.18 ^b	76.90 ^c	78.95 ^c
	SD	6.62	8.71	4.32	3.97	3.89	3.40	3.24	2.54
	CV	9.52	12.77	6.03	5.51	5.09	4.71	4.21	3.22
Rump height (cm)	Average	121.28 ^a	119.32 ^a	129.58 ^{bc}	127.13 ^b	132.02 ^{cd}	129.08 ^b	132.25 ^d	135.55 ^e
	SD	5.09	4.42	4.26	3.88	3.78	3.03	3.16	2.96
	CV	4.20	3.71	3.29	3.06	2.86	2.35	2.39	2.18
Rump width (cm)	Average	40.32 ^a	42.48 ^{ab}	45.20 ^{bc}	43.75 ^{abc}	47.67 ^{cd}	44.27 ^{abc}	47.70 ^{cd}	49.95 ^d
	SD	6.30	12.60	4.45	4.76	3.80	5.19	2.87	2.67
	CV	15.62	29.65	9.84	10.89	7.97	11.71	6.02	5.35
Rump length (cm)	Average	28.93 ^a	28.68 ^a	33.30 ^{bc}	31.75 ^{ab}	35.87 ^c	34.43 ^{bc}	34.85 ^{bc}	36.50 ^c
	SD	6.12	4.81	6.45	5.76	3.66	3.89	3.15	3.75
	CV	21.15	16.79	19.37	18.15	10.19	11.30	9.05	10.27
Body weight (kg)	Average	370.19 ^a	378.88 ^a	418.02 ^{bcd}	408.44 ^b	429.79 ^d	415.91 ^{bc}	425.32 ^{cd}	443.30 ^e
	SD	19.22	20.32	15.66	23.30	13.62	27.31	11.79	10.38
	CV	5.19	5.36	3.75	5.70	3.17	6.57	2.77	2.34

Note: The average number accompanied by different superscripts has a significant difference at the level of 5%. SD: Standard deviation, CV: Coefficient of variation

MEAT, CARCASS AND RETAIL CUTS OF KALANG BUFFALO



Description	Amount	Percentage (%)
Live weight (kg)	370	-
Cut weight (kg)	360	100
Hot carcass (kg)	171.5	47.62
Fore quarter (kg)	70.56	56.42
Hind quarter (kg)	54.52	43.58
Non carcass (kg)	188.66	52.38
fat thickness (mm)	3.5	-
Rib eye muscle area (<i>longissimus dorsi</i>) (cm ²)	58.53	-

Source: Miskiyah and Usmiati (2005)

REPRODUCTION CHARACTERISTICS

Reproduction Characteristics of Kalang Buffalo in East Kalimantan

Reproduction Characteristics	Result	Literature
Male : female ratio	1:4	1:8-10 ^{a)}
First estrous age	2 years	1 year (first estrous) ^{b)}
First mating age	2.8 years	2.5-3 years (first mating) ^{b)}
Estrous period	-	36 hours ^{b)}
Length of estrous cycles	18.5 days	21-24 days ^{c)}
Service per conception	-	1.6-2.0 ^{d)}
Conception rate	-	63% ^{e)}
Gestation period	325 days	310-315 days ^{d)}
Birth percentage	75%	54.69% ^{f)}
Calf crop	67%	50% ^{f)}
Calf mortality	11%	7.38% ^{f)}
Calf death age	1.7 months	-
Involucels Uteri	45 days	45 days ^{b)}
Calving interval	13.0 months	16.0 mounts ^{b)}

Source: a) Secretariat General Ministry of Agriculture, Center for Data and Information System for Agriculture. 2015); b) Hamdan et al, (2010); c) Parera (2011); d) Toelihere (1981); e) Hardjosubroto (1984) and f) Guzman (1980).

Female - Lactating Period





Male Buffalo

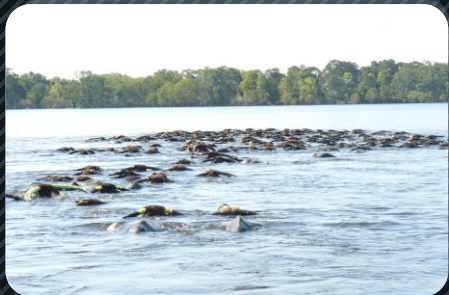


Female Buffalo



Forage

Hymenachne amplexicaulis



No.	HMT	% (bahan dasar kering)					
		SK	EE	BETN	PK	Abu	TDN
1.	<i>Hymenachne amplexicaulis</i>	31,28	1,23	42,11	11,89	13,49	59,73
2.	<i>H. aurita</i>	31,34	0,83	42,43	12,78	12,62	62,70
3.	<i>H. indica</i>	32,32	1,39	45,56	8,15	12,58	55,93
4.	<i>H. interrupta</i>	28,61	1,43	41,01	12,75	16,20	58,33
5.	<i>Pennisetum purpureum</i>	27,54	1,04	43,57	9,72	18,13	59,17
6.	<i>Panicum maximum</i>	36,70	1,73	38,08	9,34	14,15	54,34
7.	<i>Zea mays</i>	23,21	4,03	34,66	16,29	21,81	43,02
8.	<i>Sesbania bunga putih</i>	10,67	5,64	33,39	40,62	9,68	49,90
9.	Eceng Gondok	23,27	1,36	49,46	12,48	13,44	61,21

Sumber: Reksohadiprojo (1988)





Why Buffalo

- **Ruminant** are capable of utilizing fibrous feeds (Deng et al.,2007)
- Buffalo is one of **potential commodity** in supplying the meat due to the ability of buffaloes are able to digest crude fiber better 2-5% higher than than cattle.
- The nutritional content of Kalang **buffalo meat** (low calories and fat), and it is good for human consumption from health point of view.
- Buffaloes have an **important role** religiously, socially and economically.
- Improving Buffalo **farming systems** through applied technology and optimize local resources comprehensively .
- Development buffalo become essential to support **meat industry**

Buffalo VS Cattle

Komposisi daging kerbau dan sapi (per 100 g daging tanpa lemak)

Kandungan	Daging kerbau	Daging sapi
Air (g)	76,30	69,35
Protein (g)	20,39	19,05
Total lipida (g)	1,37	10,19
Abu (g)	0,98	1,05
Energi (kkal)	173	99
Asam lemak jenuh (g)	0,460	4,330
Asam lemak tidak jenuh tunggal (g)	0,270	0,380
Asam lemak tidak jenuh ganda (g)	0,270	0,380
Kolesterol (g)	46	59
Besi (mg)	1,61	2,16

Naveena BM, Kiran M. (2014). Buffalo meat quality, composition, and processing characteristics: Contribution to the global economy and nutritional security. *Animal Frontiers*. 4(4):18-24. doi:10.2527/af.2014-0029

Buffalo VS Cattle

Karakteristik kualitas daging kerbau dan sapi

Karakteristik	Daging kerbau	Daging sapi
Persentase karkas dari bobot hidup (%)	51-53	52-54
Nilai pH akhir	5,56	5,47
Daya ikat air (%)	15,33	37,00
Kandungan kolagen (mg/g daging)	0,67	0,37
Kandungan mioglobin (mg/g daging)	4,0-6,0	3,0-5,0
CIE L* (<i>lightness</i>)	34,47	33,2-41,0
CIE a* (a* > 0 merah; a* < 0 hijau)	12,21	11,1-23,6
CIE b* (b* > 0 kuning; b* < 0 biru)	10,93	6,1-11,3
Warner-Bratzler shear (N)	40,52	16,9-59,9

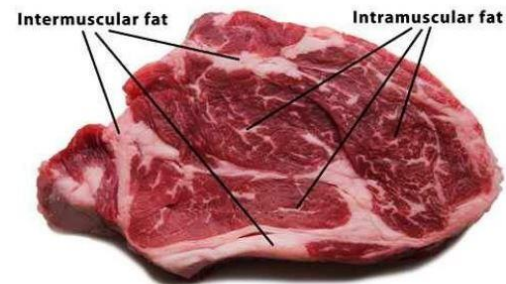
Buffalo VS Cattle

Karakteristik	Daging kerbau (<i>buffalo steers</i>)*	Daging sapi (<i>brahman cross steers</i>)*
Lemak subkutan pada otot longissimus dorsi	+	++
Warna lemak	Putih (relatif seragam)	Putih krim hingga putih kekuningan
Jaringan ikat	++	+

* Setelah pemotongan, **karkas digantung** dan **disimpan pada suhu 0-4 °C selama 48 jam**, kemudian diuji

Robertson J, Bouton PE, Harris PV, Shorthose WR, Ratcliff D. (1983). *A Comparison of Some Properties of Beef and Buffalo (Bubalus bubalis) Meat. Journal of Food Science, 48(3), 686-690. doi:10.1111/j.1365-2621.1983.tb14876.x*


Karakteristik	Daging kerbau	Daging sapi
Lemak intramuskular (<i>marbling</i>)	+	+++
	Lemak lebih di subkutan	



Tamburrano A, Tavazzi B, Callà C, Amorini A M, Lazzarino G, Vincenti S, Zottola T, Campagna M C, Moscato U, Laurenti P. (2019). Biochemical and nutritional characteristics of buffalo meat and potential implications on human health for a personalized nutrition. *Italian journal of food safety, 8(3), 8317. https://doi.org/10.4081/ijfs.2019.8317*

Buffalo VS Cattle

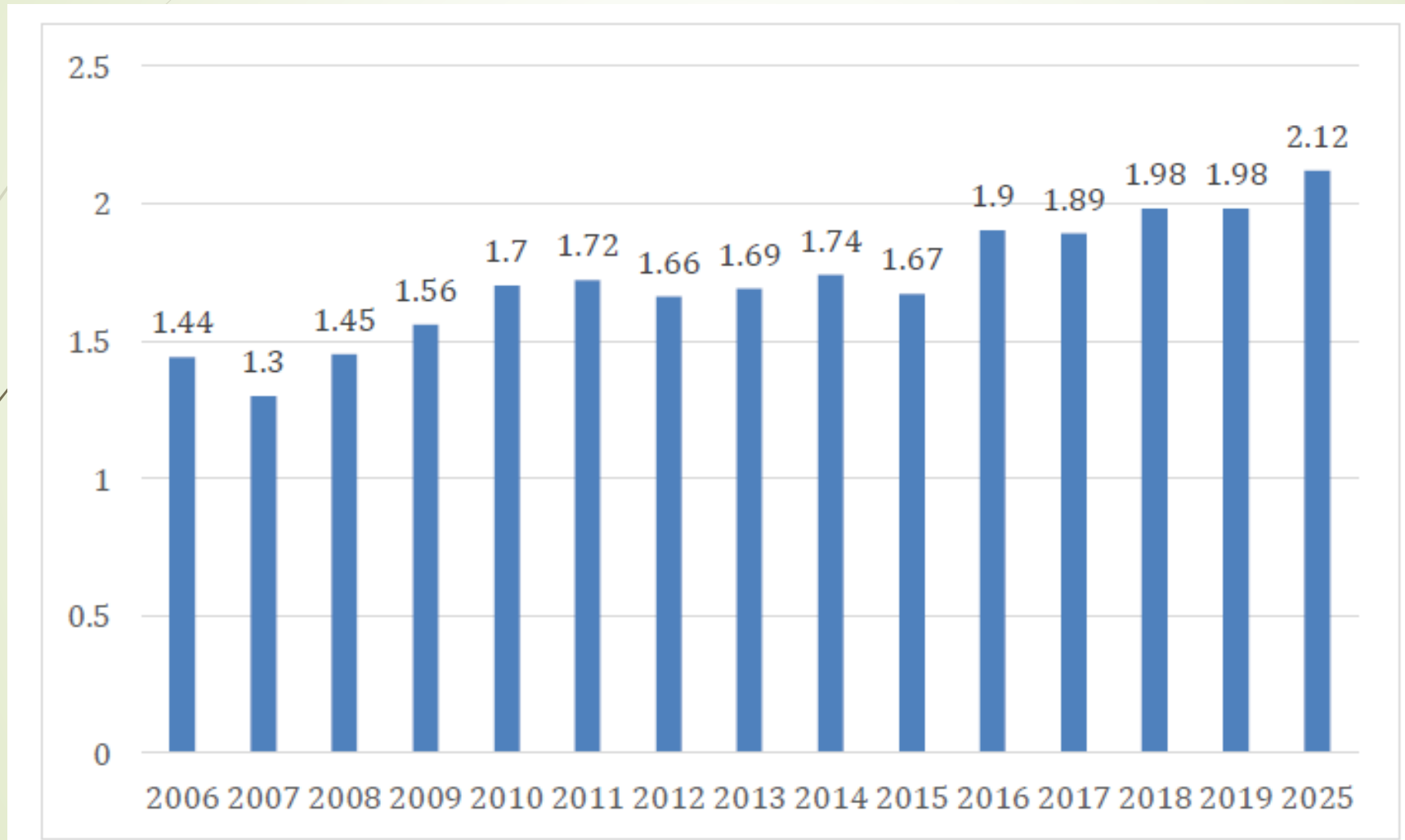
- Daging kerbau mengandung **lemak** lebih kecil dari daging sapi
- Kandungan **lemak jenuh ganda** (PUFA) daging kerbau lebih kecil dari daging sapi
- **Warna** daging kerbau lebih merah dan relatif lebih gelap dari daging sapi
- **Marbling** pada daging kerbau relatif buruk
- Kandungan **kolagen** pada daging kerbau relatif lebih banyak dari daging sapi – **kurang empuk**



Isu Pemenuhan Daging Merah

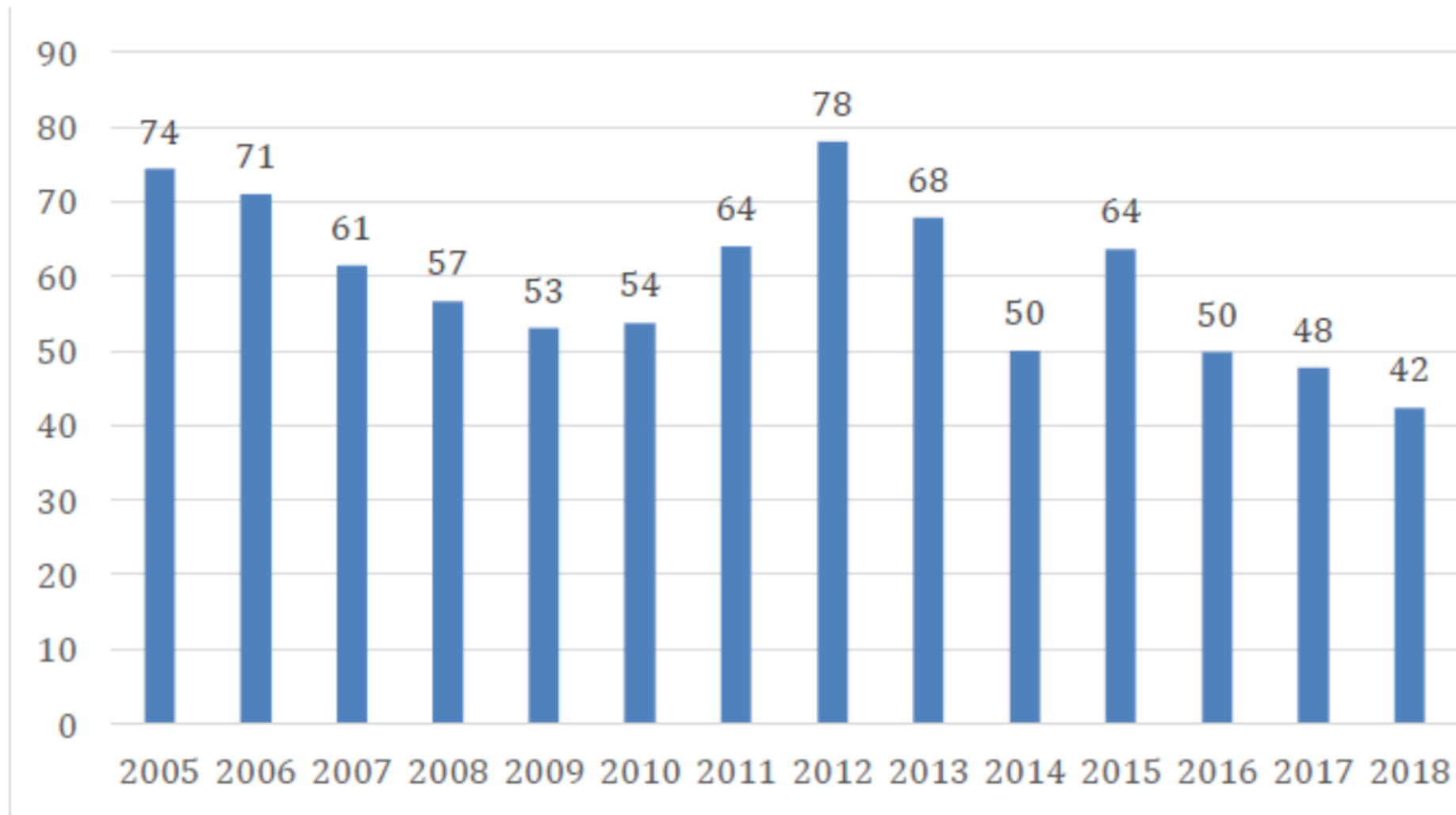
- Dipenuhi melalui impor sapi hidup dan daging, khususnya Australia
- Situasi di Australia:
 - Bencana dan perubahan iklim menyebabkan penurunan populasi sapi
 - Restocking sapi → pengurangan export
 - Terbatasnya sapi bakalan → Kenaikan harga sapi
 - Permasalahan bagi Indonesia
- Skenario bagi Indonesia
 - Jangka pendek → alternatif import dari negara lain? Pemotongan stock sapi dan kerbau dalam negeri?
 - Jangka menengah → pemanfaatan sumberdaya produksi daging merah dalam negeri

Proyeksi kebutuhan daging merah nasional



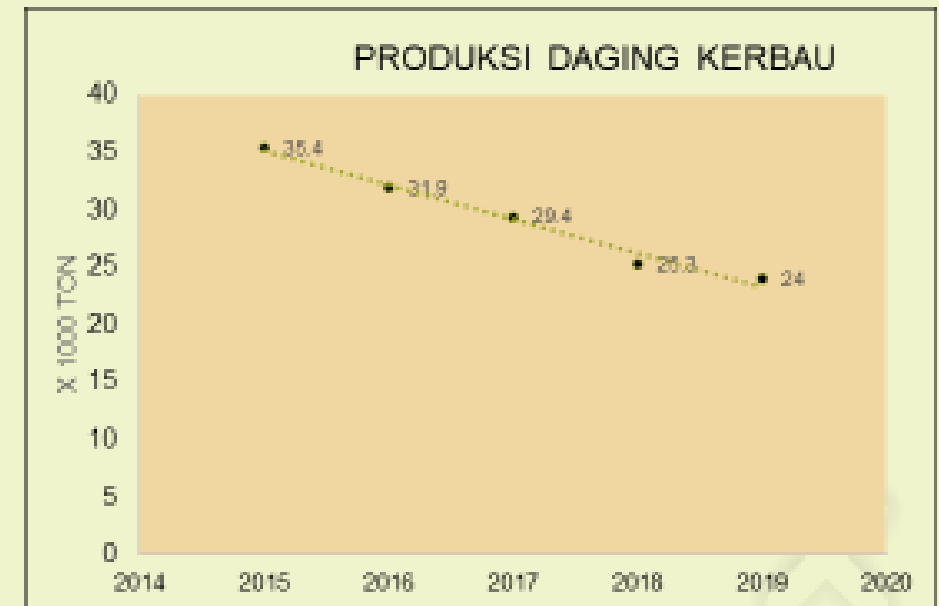
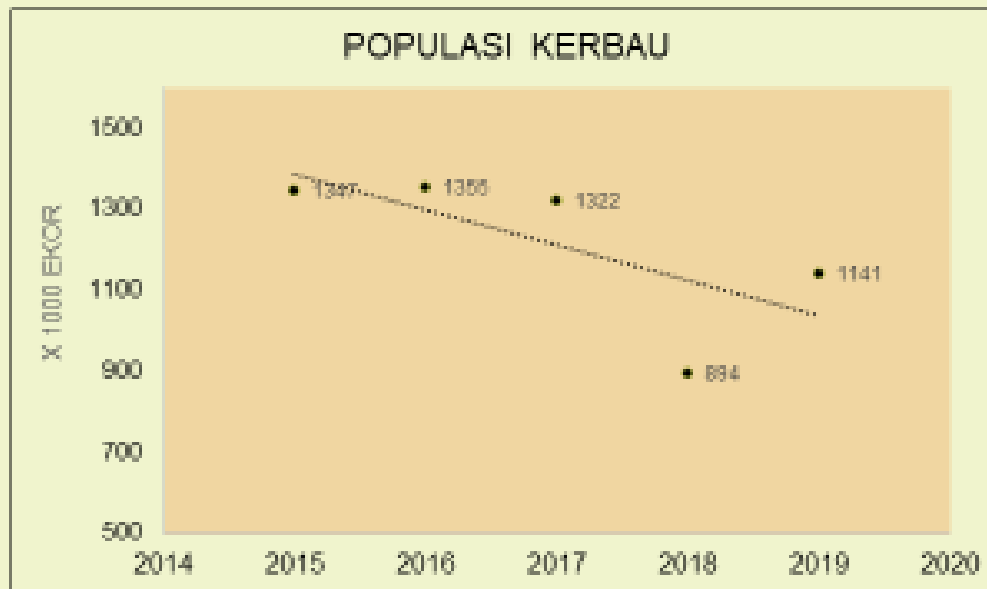
Source: Chang et al. (2020)

Kecukupan daging merah (%)



Source: Chang et al. (2020)

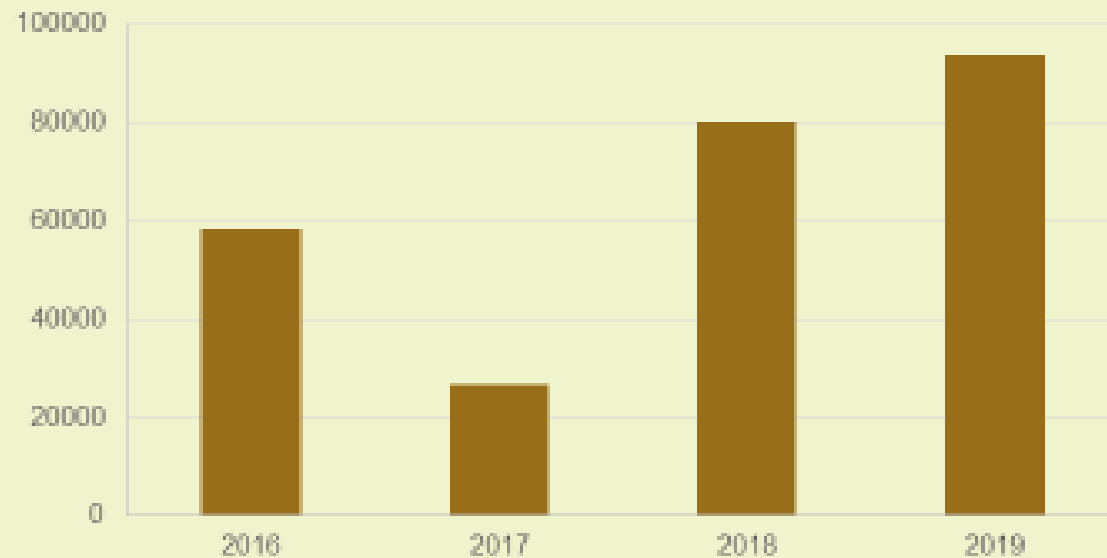
Apakah Kerbau dapat diharapkan?



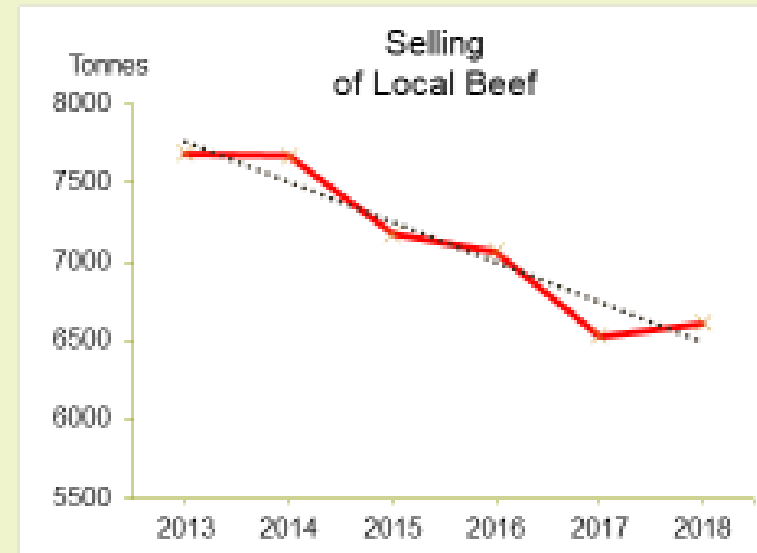
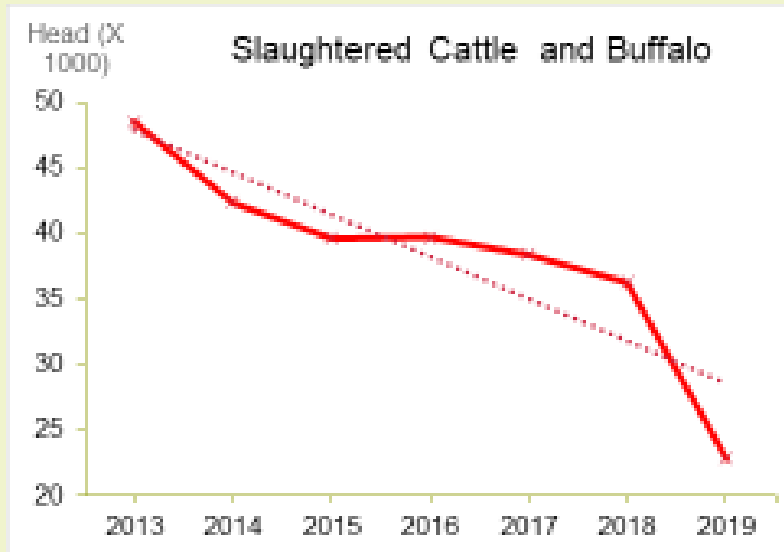
Source: BPS dan Ditjen
PKH

Impor Daging Kerbau (Ton)

- Harga eceran IBM Rp. 75-90 ribu/kg
- Konsumen utama pembuat bakso, restaurant, catering dan sebagai campuran daging sapi segar



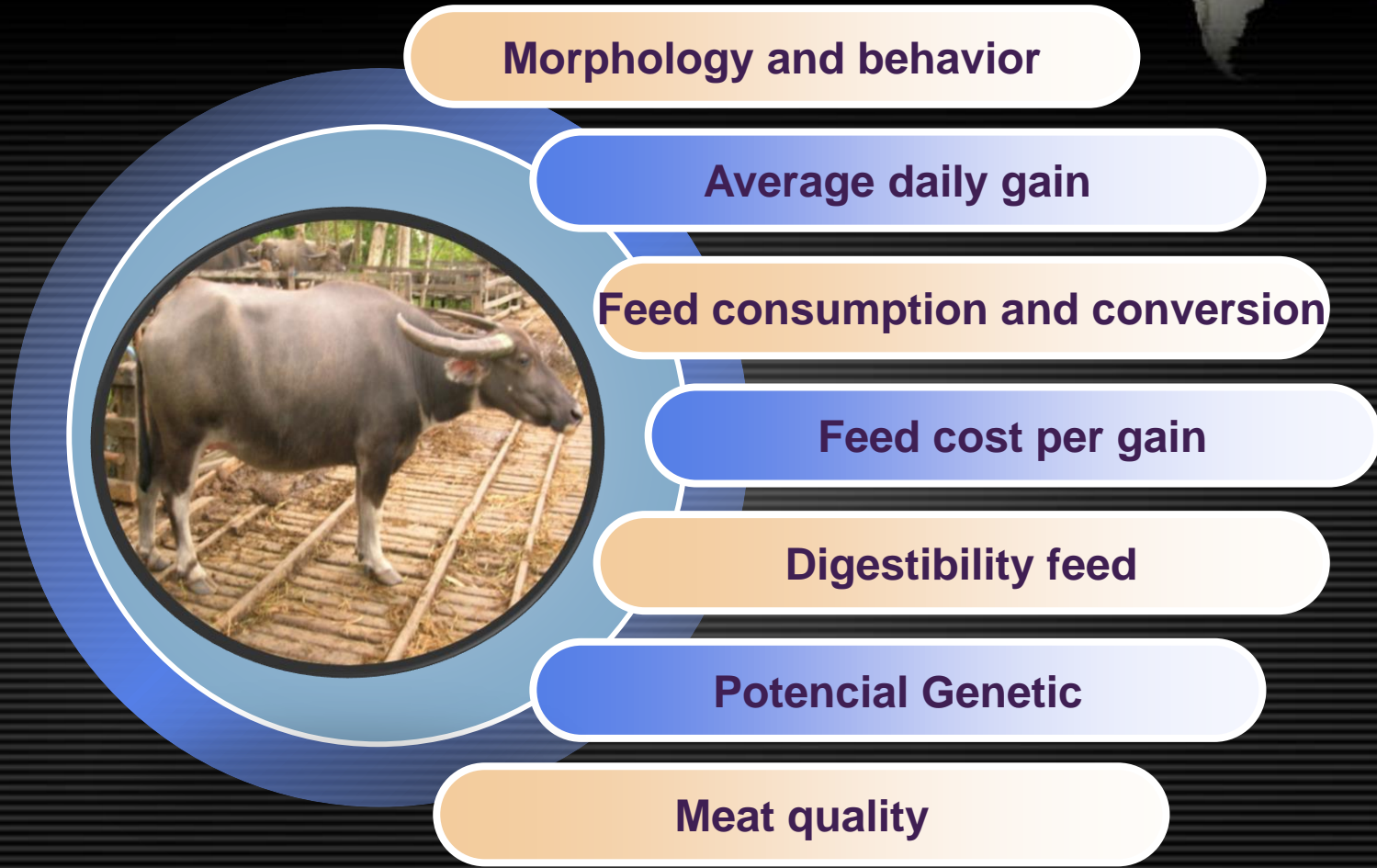
Dampak Impor IBM di Kaltim dan Kalsel



Prospek kerbau

- **Kerbau** memiliki potensi besar untuk mendukung pemenuhan kebutuhan daging merah, khususnya pada daerah yang tidak mendukung untuk pengembangan sapi potong
- Masuknya **IBM** menunjukkan penerimaan konsumen terhadap daging kerbau
- Terbatasnya suplai bakalan dari Aus saat ini berpotensi menyebabkan semakin **turunnya** populasi kerbau
- Perlunya **upaya** peningkatan populasi dan produktivitas kerbau melalui: perubahan orientasi peternak, perbaikan sistem produksi, tata laksana dan breeding

CHALLENGES





Terima Kasih



Thank You for your attention

mulawarman university





Parameter	Kerbau Rawa (Swamp Buffalo)	Kerbau Sungai (River Buffalo)
Domestikasi	4000 tahun yang lalu di Cina Selatan	5000 tahun yang lalu di India
Karakter Fisik	Postur tubuh lebih kecil dari KS	Postur tubuh lebih besar dari KR
Habitat	daerah tepian pantai, tepi sungai dan muara, rawa dan danau, padang sabana, padang rumput yang kering, hutan tropis	di sekitar sungai-sungai yang ditumbuhi banyak vegetasi
Kromosom	24 Pasang	25 Pasang
Utilitas	Penghasil daging	Penghasil susu
Warna Tubuh	Abu-abu, abu-abu kehitaman, abu-abu gelap, abu-abu kemerahan hingga belang hitam putih.	Hitam mengkilap, abu-abu gelap, coklat, abu-abu dan belang hitam putih.



Review Jurnal:

- Add. Judul Jurnalnya
- Add. Nama author, nama jurnal, waktu terbit, nomor/edisi, halaman.
- Baca dan fahami abstract dengan baik
- Tulis review anda mulai dari tujuan penelitian, metodologi, temuan/novelties, kesimpulan
- Lampirkan manuscript asli jurnal yang direview