Global animal production perspectives and correlated use of antimicrobial agents

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General Overview

Presentation overview

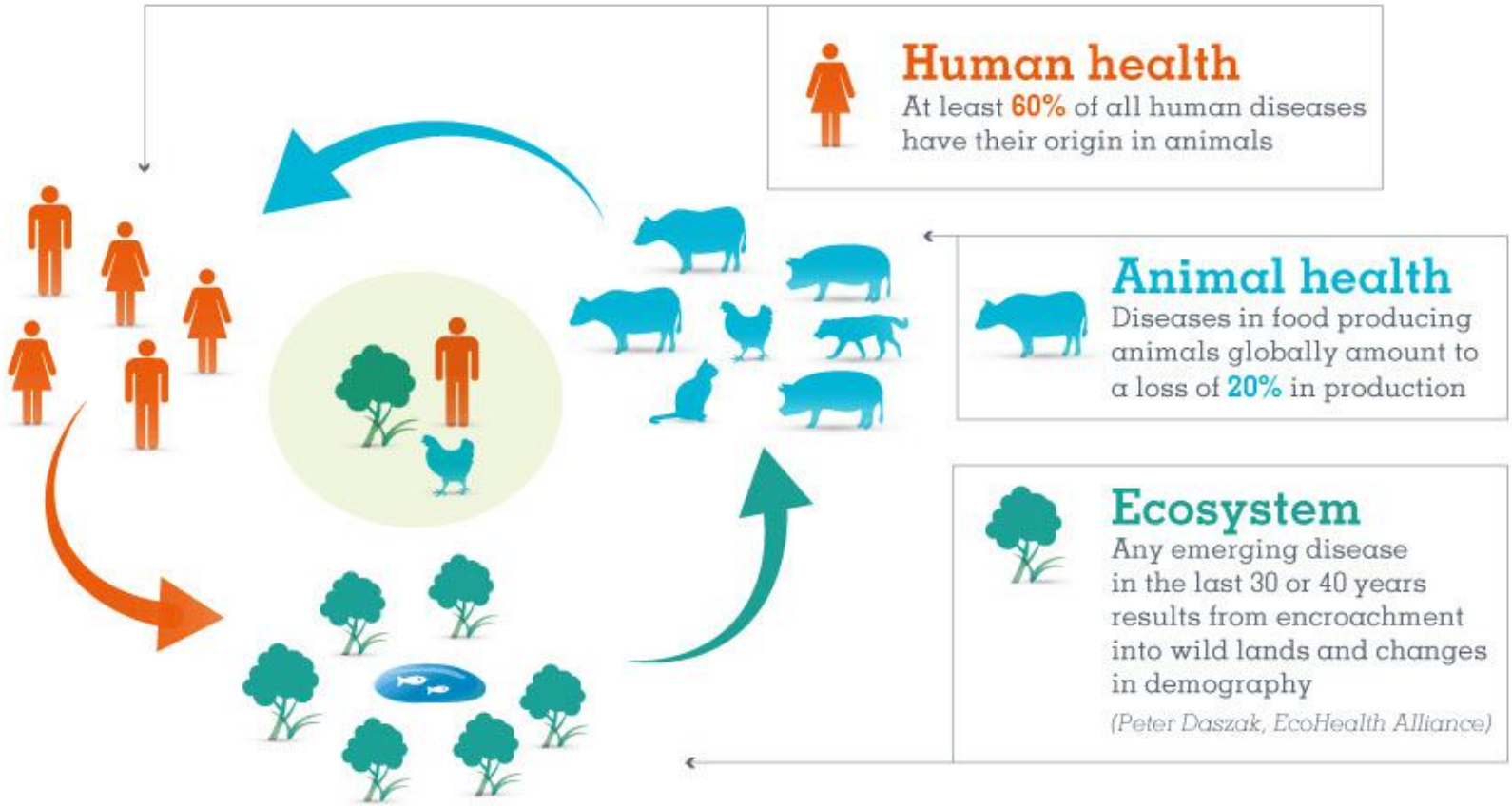
- The global population of people and livestock
- Agricultural systems and relevance to livestock production
- Information on use of antibiotics
- Conclusions

Acknowledgment of main information sources:

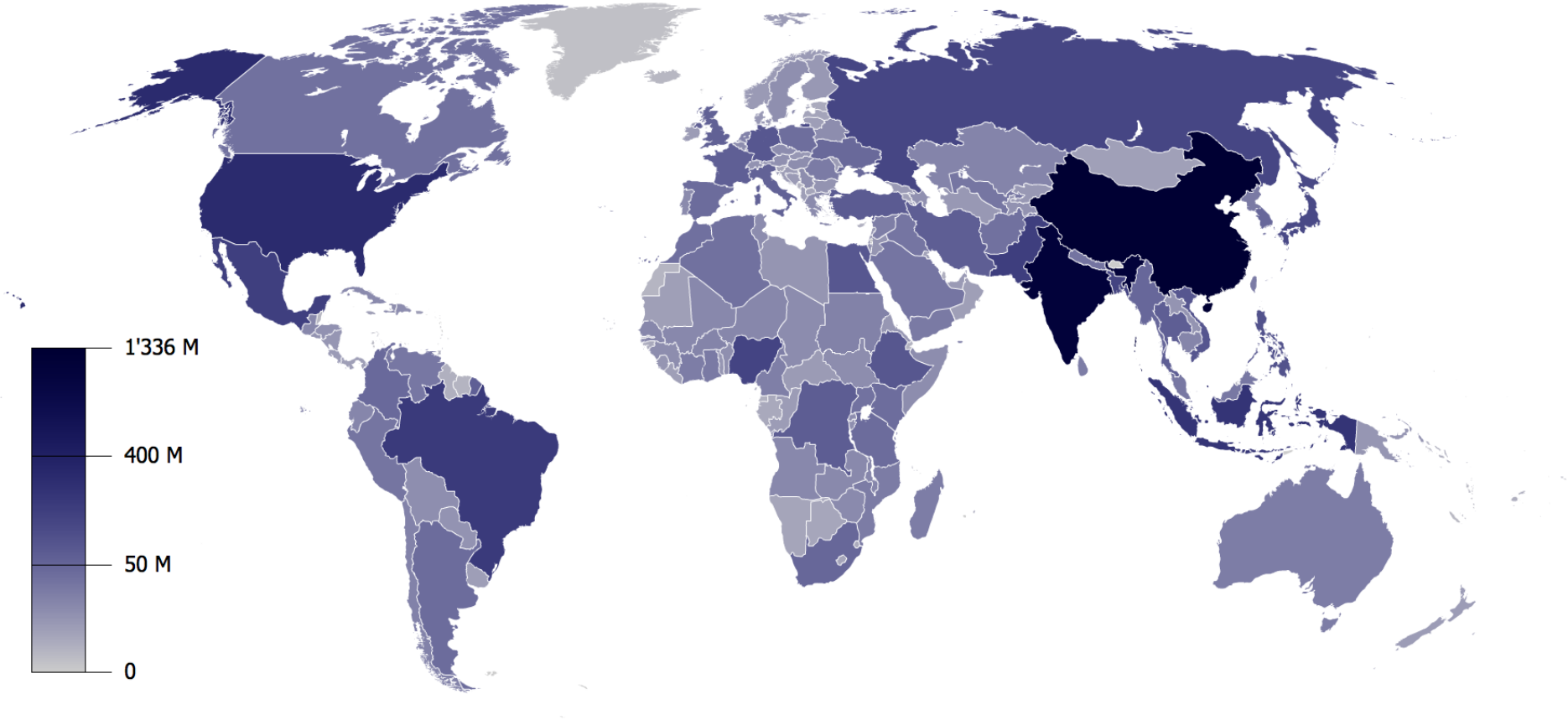
- FAO: FAOSTAT information, livestock related publications (Livestock's long shadow (2006), FAO The State of Food and Agriculture - Livestock in the balance (2009), FAO/ILRI map of livestock production systems v.5 of 2011)
- Vetnosis, an Endinburgh, Scotland based a research and consulting firm specialising in global animal health and veterinary medicine
- European Medicines Agency, 2012. 'Sales of veterinary antimicrobial agents in 19 EU/EEA countries in 2010' (EMA/88728/2012)
- FDA 2011 SUMMARY REPORT On Antimicrobials Sold or Distributed for Use in Food-Producing Animals

One World – one health

Human health, animal health and ecosystems are inextricably linked



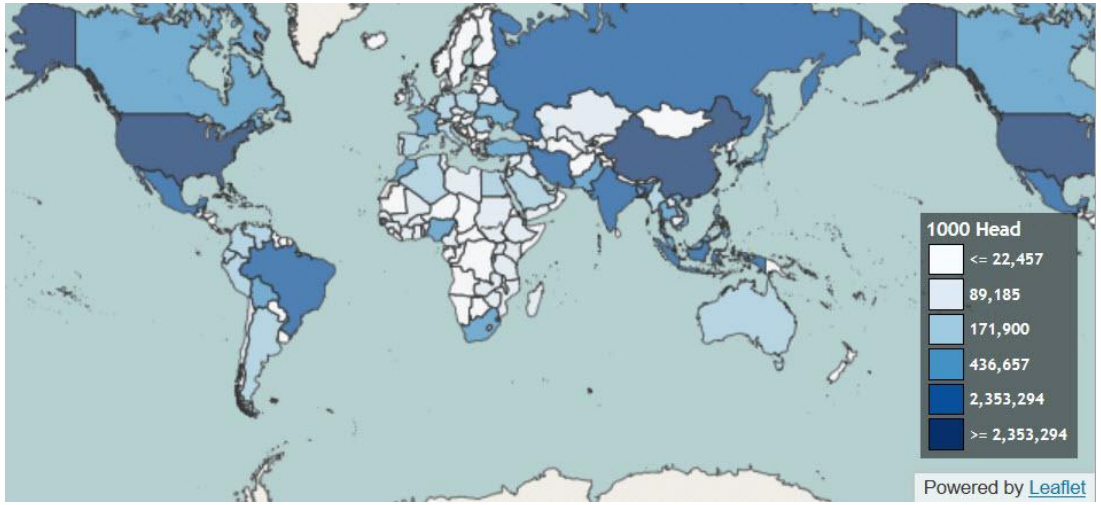
Map of human population - numbers



Wikipedia, retrieved 27 Feb.2013, based on the GeoHive estimates, obtained on March 3, 2009

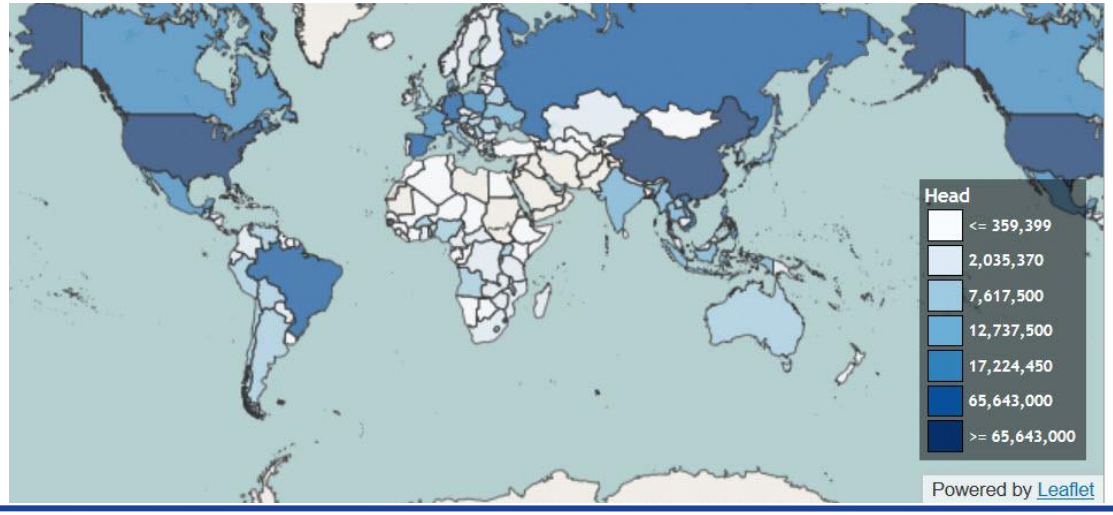
Maps of major animal populations

retrieved on 27 February 2013 from http://faostat3.fao.org/home/index.html#VISUALIZE



Poultry, 2010-2011 average

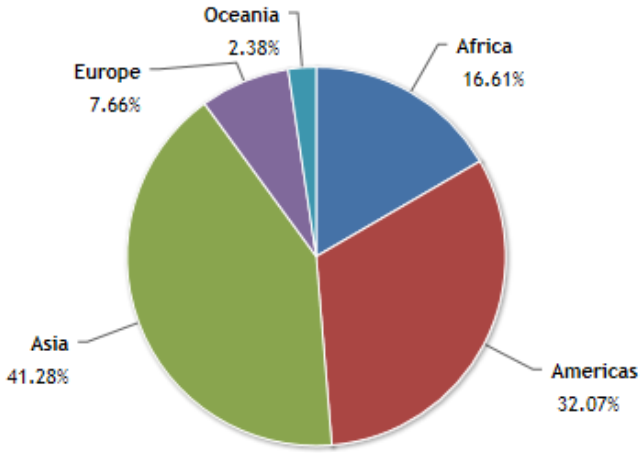
Pigs, 2010-2011 average



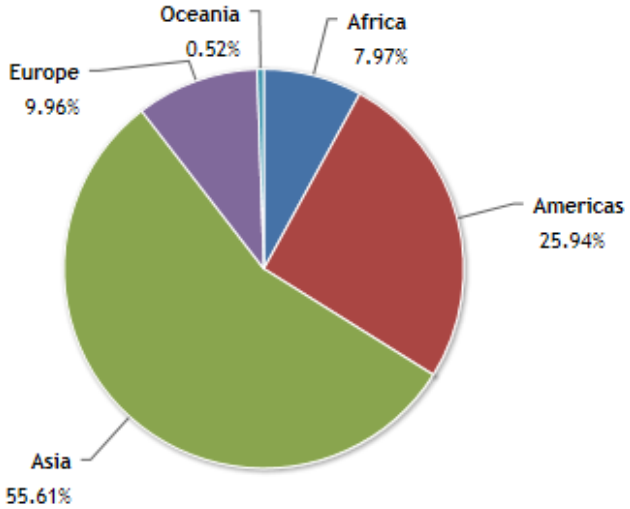
Where do most animals live

FAOSTAT 2010-2011 average numbers, regional distribution

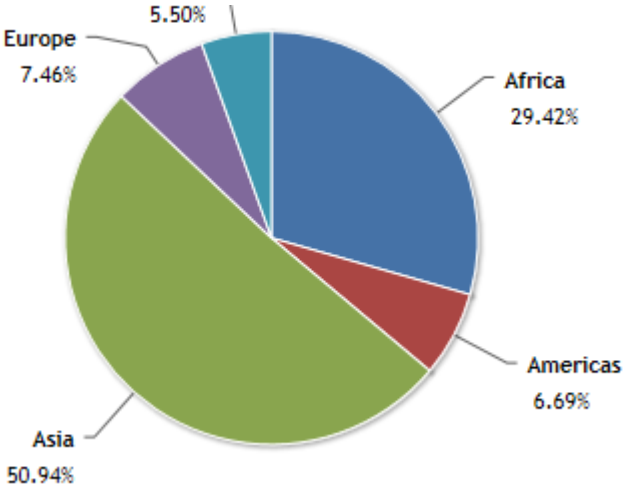
Cattle & Buffaloes



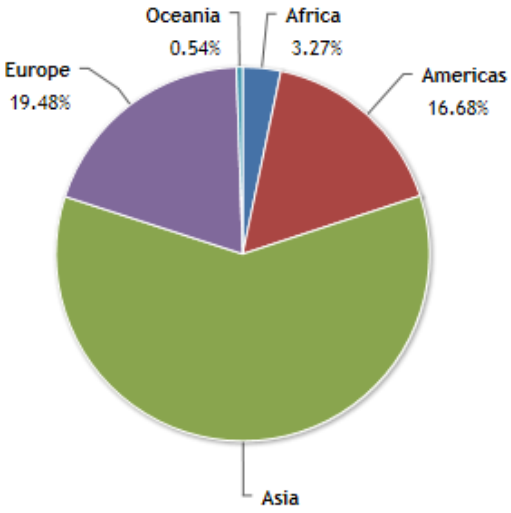
Poultry



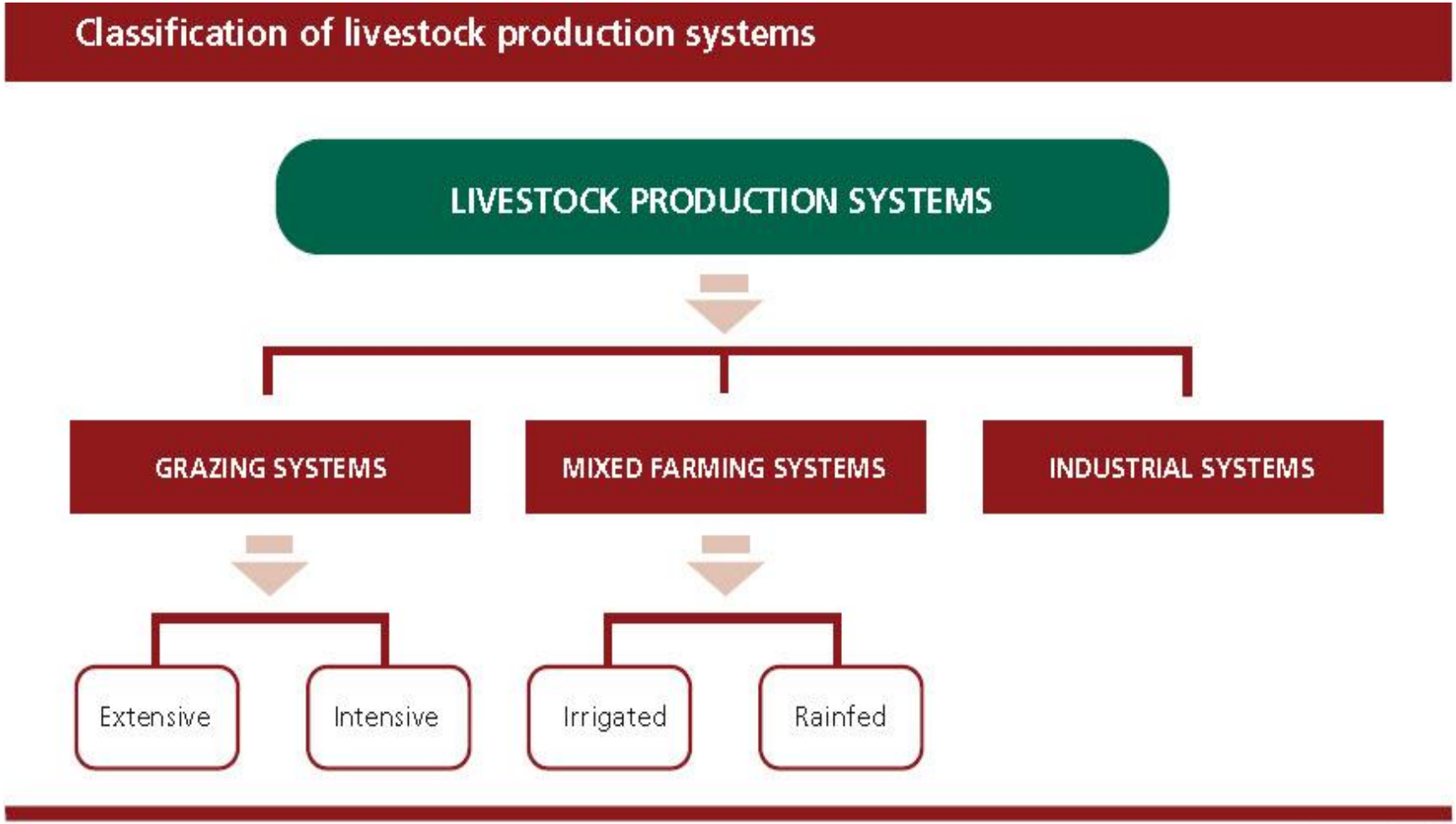
Sheep & Goats



Pigs



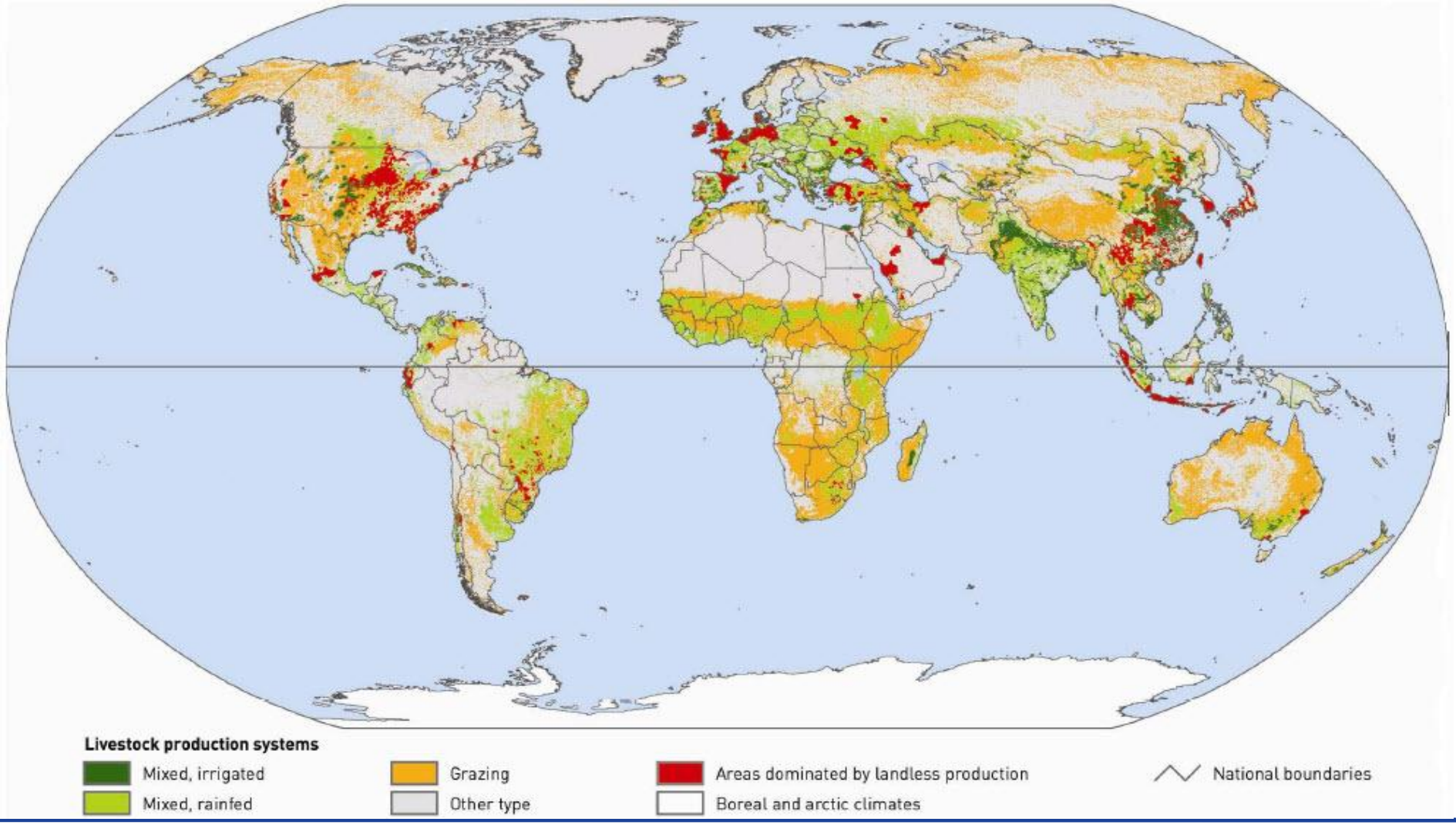
Classification of livestock production systems



Reproduced from: FAO, 2009, The State of Food and Agriculture – Livestock in the Balance

Source: FAO.

Diversity of livestock production systems



Livestock production systems

Systems and productivity

Parameter	Grassland	Mixed, rain-fed	Mixed, irrigated	Land-less
Population (million head)				
Cattle & buffalo	406	**641**	450	29
Sheep & goat	590	**632**	546	9
Production (million tonnes)				
Beef	15	**29**	13	4
Mutton	**4**	**4**	**4**	0.1
Pork	1	13	29	**53**
Poultry meat	1	8	12	**53**
Milk	72	**319**	204	-
Eggs	1	6	17	**36**

Adapted from S.W. Page & P Gaultier, OIE Rev. Sci. tech. Off. Int. Epiz., 2012, 31 (1), 145-188, *based on Steinfeld* et al.*, 2006, Livestock's long shadow; uses global averages 2001-2003*

Livestock production systems & antibiotics

Antibiotic use in animals – characteristics and drivers

- No specific studies on the relation between production systems and antibiotic use
- Characteristics of use in animals
  - Often population based treatment
  - Often young animals
  - Cost of treatment an important consideration
  - Great range of species, and different bodyweight within some species
  - Large difference in dose between different classes of antibiotics
  - Ease of treatment (via feed or water, long-lasting injections)
  - Prevention of clinical manifestations
  - Some similar classes as used in humans, some of these being critical to both fields some classes are animal use only, but top sellers are different
- Characteristics of different production systems
  - Landless: concentrated number of animals, good veterinary oversight, good biosecurity and husbandry conditions
  - Grassland: fewer animals, but less veterinary oversight, use of medicines by less trained persons

Livestock production systems & antibiotics

Antibiotic use in animals – characteristics and drivers

- Disease-related factors
  - Disease risk factors of major livestock diseases
  - Predominant diseases in the different production systems
- Climatic factors, e.g. season, climate in general
- Feed quality and regimen
- Population dynamics (e.g. number of animals per holding, housing systems, biosecurity, system for adding new animals, disease dynamic in new stock etc.)
- Aim of intervention – keep as many animals as possible healthy for diseases affecting most animals in a holding or return individual animals back to health
- Production aspects – less feed use, less effluent, higher productivity

Antibiotic use monitoring

Objective

- To obtain data on antimicrobial use – ideally number of therapeutic courses given by species at the farm level for:
  - Benchmarking (high versus "average" use)
  - Set and monitor responsible use targets
  - Investigate potential links between use & resistance prevalence for risk assessment

Challenges

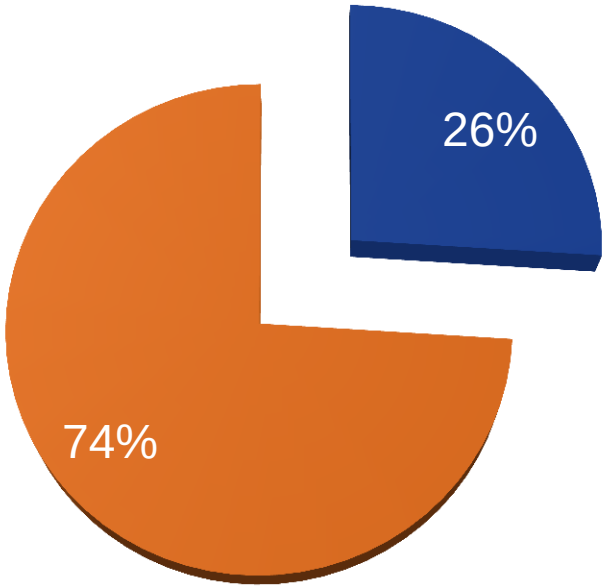
- Globally available - value based sales data – influenced by many factors

- Sales data does not inform about actual field use practices
- Data must relate to the context of actual use on-farm for clinical practice changes; national, cumulative data provides only a high-level view
- Use data should come from the vet or on-farm records
- Data should be collected by species
- Harmonized data collection methods are desirable
  - OIE Terrestrial Code Chapter 6.8
  - ESVAC approach for Europe
  - US FDA approach

Global animal health market information

Sales by product category

Total 2011 Global Animal Health Market
$ 22 billion



- Medicinal Feed Additives*/Anti-infectives
- Others

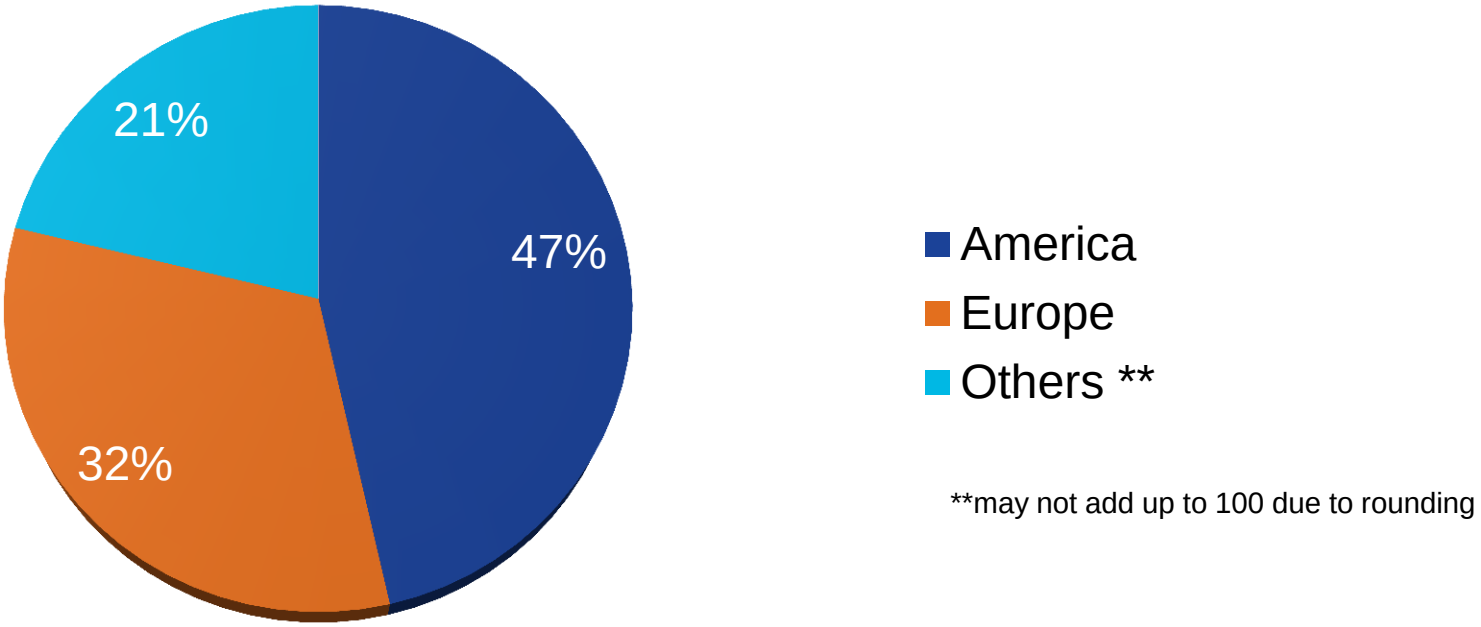
*Medicinal Feed Additives includes Anti-infectives, Parasiticides

Data courtesy of Vetnosis

Global animal health market information

Sales by region

Total 2011 Global Animal Health Market
$ 22 billion



**may not add up to 100 due to rounding

Data courtesy of Vetnosis

Antibiotic use data availability

What is currently available - examples

Europe:

- ESVAC – detailed information on amount of active ingredient sold (see http://www.ema.europa.eu/docs/en_GB/document_library/Report/2012/10/WC500133532.pdf)
- Country-specific report that look at antibiotic use information and resistance levels (e.g. Danmap (DK), Maran (NL), Germap (DE))
- In some EU countries, use data at the level of veterinarian and/or farmers are being collected (Denmark, Netherlands & plans in Belgium Germany)

US:

- FDA – annual total kg of antimicrobials sold for use in food producing animals

New Zealand:

- Survey of amounts in kg sold from 2004 to 2009

Japan:

- sales information in monetary value at irregular intervals

Antibiotic use data

Europe

Country	Total amount of antibiotics sold in tons
Austria	63
Belgium	300
Czech Republic	72
Denmark	120
Estonia	8
Finland	15
France	1,011
Hungary	209
Iceland	0.9
Ireland	93
Latvia	6.6
Lithuania	16
Netherlands	464
Norway[1]	5.7
Portugal	177
Slovenia	9
Spain	1,748
Sweden[1]	14
United Kingdom	469
Total	**4,802**

[1] Without data for farmed fish

Antibiotic use data availability

US

Table 1. Antimicrobial Drugs Approved for Use in Food-Producing Animals: 2011 Sales and Distribution Data Reported by Drug Class

	Antimicrobial Class	Annual Totals (kg[1])
Domestic	*Aminoglycosides*	214,895
	Cephalosporins[2]	26,611
	Ionophores	4,123,259
	Lincosamides[2]	190,101
	Macrolides	582,836
	Penicillins[2]	880,163
	Sulfas[2]	371,020
	Tetracyclines[2]	5,642,573
	NIR[2,3]	1,510,572
Export[4]	*Tetracyclines*[2]	15,321
	NIRE[2,5]	185,333

Ionophores in the EU are considered feed additives

NIR/NIRE: Not independently reported/Not independently reported Export where there are less than three distinct sponsors actively marketing products [Aminocoumarins, Amphenicols, Diamino-pyrimidines, Fluoroquinolones, Glycolipids, Pleuromutilins, Polypeptides, Quinoxalines, and Streptogramins]

Conclusions

Information gaps

- Understanding of antibiotic usage across agricultural production systems is incomplete – specific studies may be necessary
- Models of varying complexity and level of detail exist regarding antibiotic use in animals but available information is disparate
- Beware of comparing ‘Apples and Oranges’;
  - Volume of antimicrobials use is relevant, not the value of antimicrobials sold
  - Volume information needs to be put into a complex context in order to become data that allow comparison between countries
  - Volume does not take into account differences in the potency of compounds
  - Understand the pit-falls of comparing information and the impact of trade on data
- Aim to have:
  - Volume data
  - Species data
  - Methodology to account for dosage differences
  - Collect at prescriber level
- Start with volumes data