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More fuel for the Food/Feed debate

What are the resources used by livestock?
How to optimize production systems?

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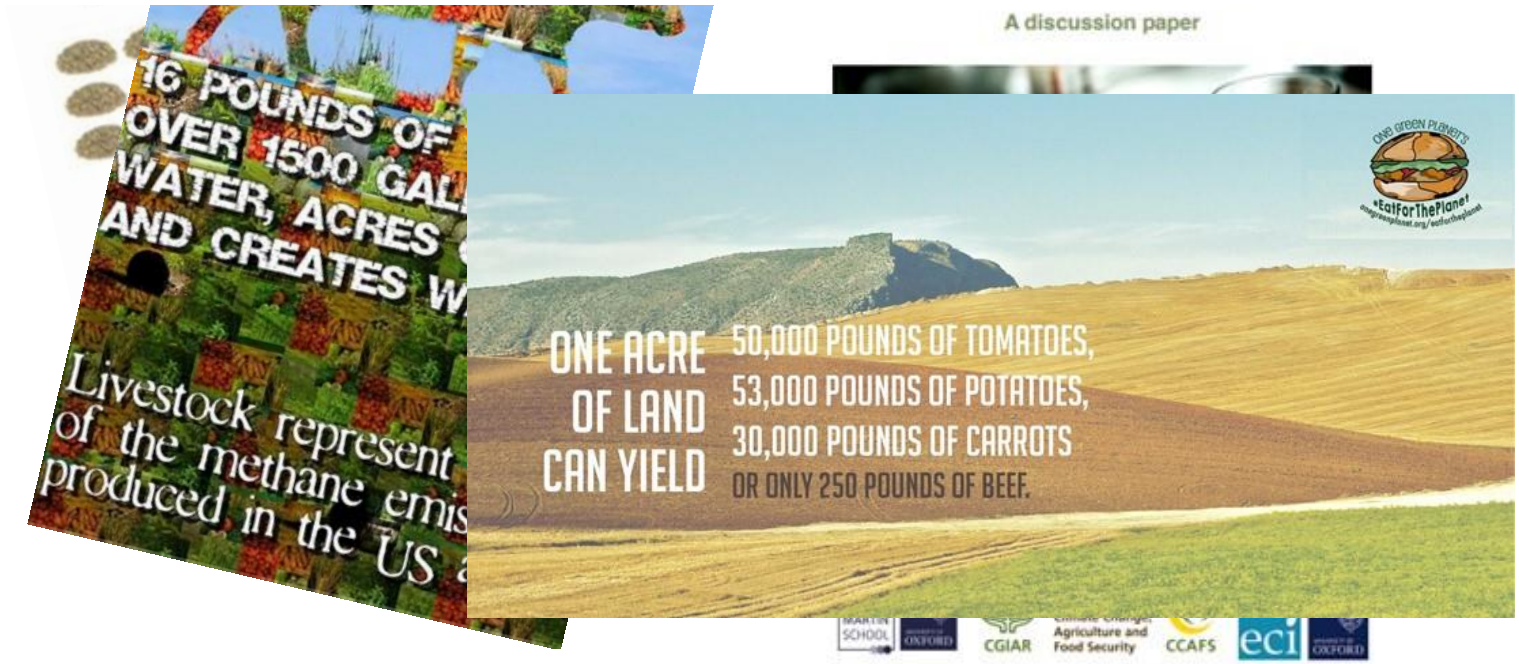
Chickens and pigs convert grain into meat at rates of two or three to one (ie, it takes 2kg of feed to produce 1kg of chicken). The ratio for lamb is between four and over six to one and that for beef starts at five to one and goes as high as 20 to one. This has long been known.



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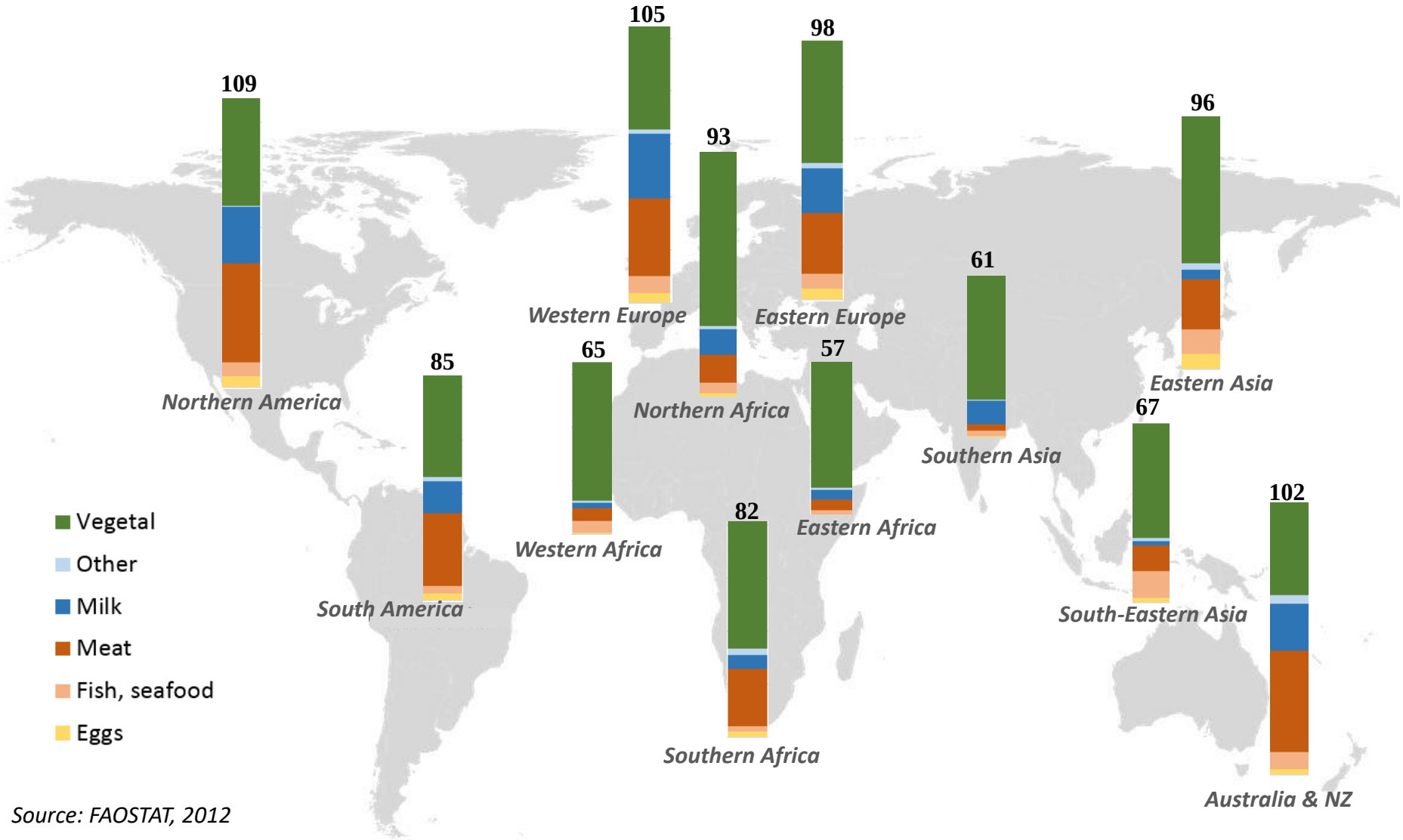
Protein consumption (g/cap/day)



Source: FAOSTAT, 2012

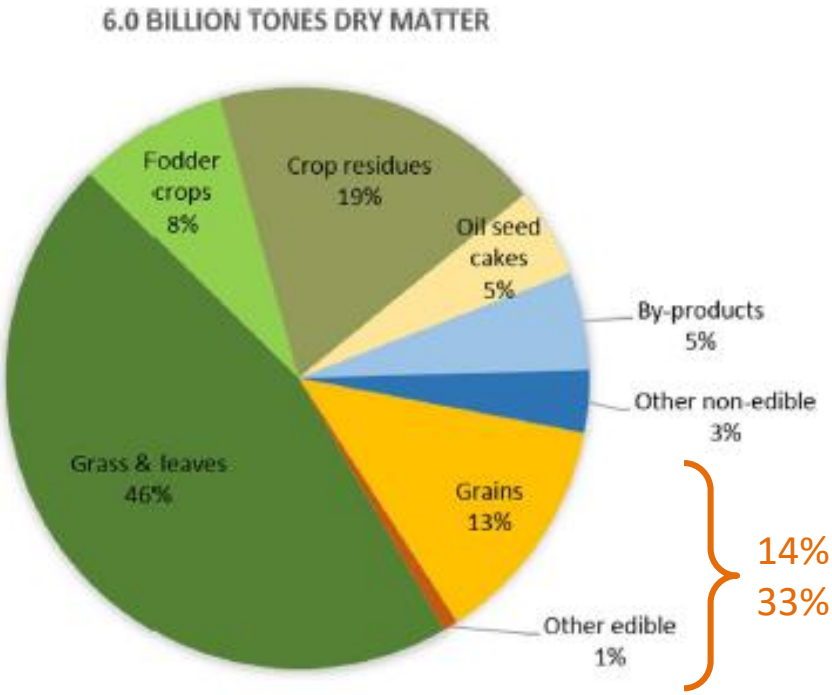
Feed/food competition

- Demand for animal source food will continue to grow
- Animal feed rations contain products that humans can eat
- Feed may be produced on land suitable for food production
- Efficiency in converting feed into human-edible products needs to be better assessed

Existing figures hide the diversity of production systems and the total consumption of grain by monogastrics.

→ Lack of global database of livestock feed

Global livestock feed ration composition



Fodder crops: grain and legume silage, fodder beets
Crop residues: straws and stover, sugar cane tops, banana stems
By-products: brans, corn gluten meal and feed, molasses, beetroot pulp and spent breweries, distilleries, biofuel grains
Other non-edible: second grade cereals, swill, fish meal, synthetic amino acids, lime
Other edible: cassava pellets, beans and soy beans, rapeseed and soy oil

Global feed conversion ratios

	Protein	FCR 1	FCR 2	Meat FCR 2	FCR 3	Protein FCR 2
	Mt/year	Kg DM /kg protein	Kg edible DM /kg protein	Kg edible DM /kg meat	Kg compete DM /kg protein	Kg edible protein /kg protein
Ruminants	36,355	133	6	2.8	6.7	**0.6**
Monogastrics	38,246	30	16	3.2	20.3	2.0
All	74,601	80	12	3.1	13.7	1.3

Feed conversion ratios by production systems

	Protein	FCR 1	FCR 2	Meat FCR 2	FCR 3	Protein FCR 2
	% global livestock	Kg DM /kg protein	Kg edible DM /kg protein	Kg edible DM /kg meat	Kg compete DM /kg protein	Kg edible protein /kg protein
Grazing cattle non OECD	8%	195	1.6	0.9	1.9	**0.2**
Mixed cattle non OECD	**18%**	171	4.8	3.1	5.6	0.5
Beef feedlots OECD	2%	62	44	9.4	45.4	4.1
Industrial pigs non OECD	7%	29	20	4	24.1	4.4
Industrial broilers OECD	11%	26	18.6	3.5	24.7	**5.2**

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Global LU for forage and feed production

Million ha	Grasslands convertible	Grasslands non convertible	Silage or beets	Cereal grains	Oilseed and cakes	Other crops [a]	By-products [b]	Crop residues [c]	TOTAL
Cattle + buffaloes	524	479	57	71	31	0	26	103	1291
Small ruminants	160	782	10	2	1	0	3	19	977
Poultry	0	0	0	93	60	1	1	0	155
Pigs	0	0	0	45	39	3	3	4	94
All	**684**	**1,261**	67	211	131	4	33	126	2,516

a Pulses, cassava and banana
b Corn gluten feed and meal, brans, middling, molasses, sugar beet pulp, and by-products from breweries, distilleries and biofuels
c Straws, sugar cane tops, banana stems

Total arable land used to feed livestock: 560 Mha, 40% of global arable land

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Projections of future demand for meat, feed use and land use

Range of 2025/2010 relative change for high FCR increase

FCR increase: 5 % (ruminants) and 15% (monogatrics)

2025/2010	Meat production	Feed intake		Area	
		Edible	Non edible	Edible	Non edible
World	21 %	11 %	6 %	-8 %	4 %

Other resources: e.g. water

- 15,000 L/kg beef is a commonly cited figure
- But it hides the diversity of production systems
- It also hides the type of water used by livestock. 92% is actually green water (rainwater that falls on grasslands and crop fields and is absorbed by plants). The water taken from rivers, lakes and groundwater (blue water) is less than 10% of the total
- The LEAP partnership has produced guidelines for water use assessment in livestock, which are currently under public review

Conclusion

- Livestock are resource hungry. They use 1/3 of global cereal production and 40% of global arable land.
- But 86% of intake in DM is not currently edible for humans
- Livestock produce high quality protein on large areas with no alternatives
- Modest improvements in FCR can prevent further expansion of arable land dedicated to feed production
- Circular bio-economy: encourage the use of non-edible materials (crop residues, by-products, swill). Cf Japan for example
- Livestock have numerous diverse functions (traction, manure, asset)

Thank you

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