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The Increased Consumption of Animal Products: Local Aspirations-Global Opportunities

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Introduction

There has been an increasing pressure on the livestock sector to meet the global demand for high-value animal protein. The world's livestock sector is growing at an unprecedented rate and the driving force behind this enormous surge is a combination of population growth, rising incomes and urbanization. Annual meat production is projected to increase from 218 million tonnes in 1997- 1999 to 376 million tonnes by 2030. There is a strong positive relationship between the level of income and the consumption of animal protein, with the consumption of meat, milk and eggs increasing at the expense of staple foods.

Urbanization is a major driving force influencing global demand for livestock products. Compared with the less diversified diets of the rural communities, city dwellers have a varied diet rich in animal proteins and fats, and characterized by higher consumption of meat, poultry, milk and other dairy products. There has been a remarkable increase in the consumption of animal products in countries such as Brazil and China, although the levels are still well below the levels of consumption in North American and most other industrialized countries. As diets become richer and more diverse, the high-value protein that the livestock sector offers improves the nutrition of the vast majority of the world.

Livestock products not only provide high-value protein but are also important sources of a wide range of essential micronutrients, in particular minerals such as iron and zinc, and vitamins such as vitamin A. For the large majority of people in the world, particularly in developing countries, livestock products remain a desired food for nutritional value and taste. Can the demand be met through sustainable improvements in production systems? Despite fluctuations in supply and demand caused by the changing state of fisheriesresources, the economic climate and environmental conditions, fisheries, including aquaculture, have traditionally been, and remain an important source of food in many countries and communities. After the remarkable increase in both marine and inland capture of fish during the 1950s and 1960s, world fisheries production has levelled off since the 1970s.

With the majority of stocks being fully exploited, it is very unlikely that substantial increases in total catch will be obtained in the future. In contrast, aquaculture production has followed the opposite path. Starting from an insignificant total production, inland and marine aquaculture production has been growing at a remarkable rate, offsetting part of the reduction in the ocean catch of fish. Currently, two-thirds of the total food fish supply is obtained from capture fisheries in marine and inland waters, while the remaining one third is derived from aquaculture. Any recent increases in per capita availability have been obtained from aquaculture production, from both traditional rural aquaculture and intensive commercial aquaculture of high value species. It is clear that any future increase in protein supply from fish will have to come from increases aquaculture production.

Can the demand be met through sustainable improvements in production systems? In addition, the legalization of marijuana in Canada, expected to occur in the coming summer of 2018, will open new doors for industry and research development. That will mean a considerable amount of research will be needed in order to verify claims, regulate products and test new chemicals. The opportunities arisen from this scenario will be channeled by Olds College Centre for Innovation, which has a fully equipped in vitro laboratory to test novel compounds for animal feedstuff industry.

Addressing the Protein Gap: The Role of Livestock?

About 70 per cent of people in the world's poorest 62 countries depend on livestock; improving livestock systems would potentially have important contributions towards poverty reduction and enhanced sustain ability of livelihoods. Although some countries are gradually scaling up their budgetary allocations to agriculture, very limited financial flows actually reach livestock and fisheries sectors. It is important to improve access to animal proteins through better animal husbandry,

genetics, and more investment in animal health, particularly to enhance quality control. Globally, some private companies and public research institutes are working collaboratively with various organizations in making livestock vaccines, diagnostics and medicines accessible and affordable to many local people whose sustenance depends on livestock, more so in the tropics. Currently, these institutions and its partners are focusing on scaling up the production and addressing weak links in the distribution channels of effective vaccines (which may exist but are not accessible), particularly targeting five priority diseases: East Coast Fever, sheep and goat pox, Newcastle disease, Rift Valley Fever and Porcine cysticercoids'. Promoting uptake of research to strengthen the livestock health supply chains is also critical. But development process needs to incorporate greater participation of diverse local communities and governance institutions, better data generation, simple innovations, donor consistency, harmonized regulatory framework, and increased advocacy for livestock.

Increasing Sustainability of Livestock Production Systems through Better Use of Locally Available Animal Feed

Over the last decade, demand for animal products has increased rapidly; annual growth rates of the livestock sector have been around 3.8% compared to 2.7% for food crops and 1.2% for non-food crops. Demand has been met to a large extent by specialized and intensive production systems. Questions have to be asked about their sustainability given their dependence on expensive and scarce inputs. What will happen when the oil runs out? On the other hand, livestock contributes to the livelihoods of 70 per cent of the world's rural poor. Livestock ruminants are extremely powerful in the sense that the can survive and be productive eating only fibrous materials [1-5]. Questions have to be asked also about how they can benefit from the increased global demand for meat and milk. It is important that the developing world increases its livestock production as that is where much of the increased demand is going to occur. To achieve this, production per animal needs to rise considerably (Table 1). Of all the factors that currently limit performance, without doubt one of the most important is animal nutrition.

Table 1: Beef production per animal. The comparison between developed and developing countries

Developed Developing Countries	
Cattle numbers (millions)	410 858
Meat production (million tones)	34.6 15.2
Meat production (per animal-Kg)	84.317.7

Emphasis in tropical animal husbandry is changing towards sustainable systems of livestock production based on locally available feed resources (rather than imported grains and supplements) [6-8]. Greater notice is being given to the biodiversity of plant materials and their role in integrated farming systems as a way of improving sustainability. There is a need for increasing knowledge of available feedstuffs and also for a better understanding of anti-nutritive factors in these materials and how they flow in the food chain [9-14]. Considerable potential exists for improving performance of ruminants and nonruminants.

The Demand for Protein and the Fisheries Sector: What Does the Future Hold?

Demand for fish has steadily increased as the human population grows, but the bulk of supply still comes from natural water bodies; recent trends in climate change show that production might decline considerably in the future. A paradigm shift is inevitable if fisheries resources are expected to make significant contributions in the widening proteins gap. Perhaps it might be worthy to incorporate fish production within irrigation projects, seasonal ponds and rice paddies. However, in order to assure sustainability, it is important for relevant stakeholders to clearly define and monitor implementation of regulations necessary to govern the quality of inputs and production methods. It is known that several chemical travel across the food chain and reach consumers via animal products [15], therefore scientific studies will be needed to set the correct standards for novel production systems.

Turning to the land to grow fish: moving from marine fish meals and oils to vegetable protein and lipids. By 2012 it is likely that 90 per cent of global fish oil production will be consumed in feed for aquaculture systems. This cannot continue. EU restrictions on dioxins and PCBs in feeds could limit use in the near future. In any event, there is an urgent need to counter excessive exploitation of marine resources. We need to find alternative aqua-feeds based on vegetable proteins and oils. Recent EU-funded research shows what is possible. In salmon and trout systems, replacement of fish oil (FO) with vegetable oil (VO) up to 100% did not affect fish growth or feed conversion. In sea bass and sea bream, replacement of up to 60% of FO with VO had no detrimental effect. Greater levels of substitution were less successful but delaying introduction of the VO diet until fish size reached 250g was successful. In salmon fed 100% VO, flesh docosahexaenoic acid (22:6n-3; DHA) and eico-sapentaenoic acid (20:5n-3; EPA) concentrations were reduced by ~65% while in trout the reduction was ~50%. In sea bass and sea bream fed 60% VO DHA and EPA were reduced by ~50% while in bream fed 100% VO the reduction was ~65%. Generally, reduction of flesh DHA and EPA was less in fish fed diets with a low PUFA content (e.g. olive oil or a VO blend of rapeseed, palm and linseed oils) than when fed a single VO high in PUFA. Currently rapeseed, soya, palm and linseed oils dominate the potential FO substitutes based on fatty acid composition, price and availability. New strains of high oleic/low PUFA oils including sunflower (Sun seed), soya and rapeseed may be suitable in the future.

However, there are a number of currently underexploited plant oils that could replace some or all of the above and have

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better compositions and possibly prices. These include Camelina sativa, Limnanthes alba, Cipher species and synthesized triglycerides. Most of the nutrients found in the edible portion of fish are derived from feed. Farmed fish can therefore be "tailored" to deliver optimal levels of fatty acids, vitamins and minerals to human consumers.

By careful selection of feed raw materials, levels of undesirable substances can be limited and controlled. This gives aquaculture produce a distinct advantage over wild fish. Complete replacement of both fish meal and fish oil will be difficult in carnivorous species but significant reductions of both should be possible with careful raw material selection. Recent studies suggest that farmed salmon could become a net fish protein producer by using low fishmeal/high plant meal diets. We must ensure that essential micronutrients, that may be reduced in diets with high levels of FM & FO replacement, continue to provide adequate levels to ensure fish and consumer health.

Conclusion

In order to address the protein gap generated by the growth in the human population, new opportunities will arise for some animal production sectors as discussed in the text. Fisheries will play an important role in addressing the gap and contributing for the sustainability of the system. Moreover, the utilization of industry residues for animals will need to be better regulated and scientifically tested [8,16] so that farmers will be properly informed and how and when to use them and the human population will always have safe products on the table, without unidentified/untested chemicals that flow in the food chain and reach consumers. New methodologies to test animal feedstuff will need to developed in order to fill this market gap.

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References

1. Demeyer DI (1981) Rumen microbes and digestion of plant cell walls. Agriculture and Environment 6(2-3): 295-337.
2. McDonald P, Edwards RA, Greenhalgh JFD, Morgan CA, Sinclair LA, et al. (2011) Animal Nutrition. (7th edn), Pearson Education Ltd, UK.
3. McDougall EI (1948) Studies on ruminant saliva: the composition and output of sheep's saliva. Biochem J 43(1): 99-100.
4. Russel JB, Hespell RB (1981) Microbial rumen fermentation. J Dairy Sci 64(6): 1153-1169.
5. Benchaar C, Petit HV, Berthiaume R, Whyte TD, Chouinard PY (2006) Effects of addition of essential oils and monensin premix on digestion, ruminal fermentation, milk production, and milk composition in dairy cows. J Dairy Sci 89(11): 4352-4364.
6. Benchaar C, Petit HV, Berthiaume R, Ouelle DR, Chiquette J, et al. (2007) Effects of essential oils on digestion, ruminal fermentation, rumen microbial populations, milk production, and milk composition in dairy cows fed alfalfa silage or corn silage. J Dairy Sci 90(2): 886-897.
7. Calsamiglia S, Busquet M, Cardozo PW, Castillejos L, Ferret A (2007) Invited review: essential oils as modifiers of rumen microbial fermentation. J Dairy Sci 90(6): 2580-2595.
8. Makkar HPS, Vercoe PE (2007) Measuring methane production from ruminants. Springer Verlag.
9. Parodi PW (1999) Conjugated linoleic acid and other anticarcinogenic agents of bovine milk fat. J Dairy Science 82(6): 1339-1349.
10. Poungchompua O, Wanapat M, Wachirapakornb C, Wanapatc S, Cherdthongb A (2009) Manipulation of ruminal fermentation and methane production by dietary saponins and tannins from mangosteen peel and soapberry fruit. Arch Anim Nut 63(5): 389-400.
11. Yang WZ, Benchaar C, Ametaj BN, Chaves AV, He ML, et al. (2007) Effects of garlic and juniper berry essential oils on ruminal fermentation and on the site and extent of digestion in lactating cows. J Dairy Sci 90(12): 5671-5681.
12. Wanapat M, Khejornsart P, Pakdee P, Wanapat A (2008) Effect of supplementation of garlic powder on rumen ecology and digestibility of nutrients in ruminants. Journal of the Science of Food and Agriculture 88(13): 2231-2237.
13. Wang CJ, Wang SP, Zhou H (2009) Influences of flavomycin, ropadiar, and saponin on nutrient digestibility, rumen fermentation, and methane emission from sheep. Animal Feed Science and Technology 148(2-4): 157-166.
14. Yang WZ, Ametaj BN, Benchaar C, He ML, Beauchemin KA (2010) Cinnamaldehyde in feedlot cattle diets: Intake, growth performance, carcass characteristics, and blood metabolites. J Anim Sci 88(3): 1082-1092.
15. Benchaar C, Chouinard PY (2009) Short communication: Assessment of the potential of cinnamaldehyde, condensed tannins, and saponins to modify milk fatty acid composition of dairy cows. Journal of Dairy Science 92(7): 3392-3396.
16. Alexander G, Singh B, Sahoo A, Bhat TK (2008) *In vitro* screening of plant extracts to enhance the efficiency of utilization of energy and nitrogen in ruminant diets. Animal Feed Science and Technology 145(1-4): 229-244.

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