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HOW SAPIENS IS HOMO?

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Summary

Global demands for livestock products will probably increase two - or three-fold during (the next 30 to 50 years). The only environmentally satisfactory way of meeting this challenge will be to increase productivity per hectare and per animal. Similar increases have been achieved in some parts of the world during the last 50 years. However, such increases on a global scale will only be possible if greatly increased resources are allocated to national and international agricultural research, extension and development.

Introduction

At present there are some 6 billion people in the world. It is predicted that the world population will peak at about 10 to 12 million by the year 2050. Most of these people will live in Asia, where economies are generally booming and personal incomes are increasing. In combination, these developments make it likely that global food requirements will increase between two and three times during the first half of the next century.

Moreover, as those living in less developed countries become more affluent, their demands for high quality foods, such as animal products, will increase faster than their demands for cereals. Although enterprises like milk and meat production require a greater share of farm resources per unit of production than does crop production, the omnivorous nature of Homo sapiens means that the global consumption of animal proteins and fats will rise rapidly in the foreseeable future.

At present, the daily animal protein consumption per person in Asia is estimated to be some 15 grams. However, it will not be many years before some four billion Asians will expect a daily consumption of at least 50 grams

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of animal protein, bringing it closer to the 71 grams that are now consumed daily by the average American. The global challenge facing livestock producers and animal scientists is therefore to double or treble milk and meat production during the next 50 years.

Sustainable production

This challenge can only be met one of two ways. The first is to double or treble the livestock populations of the world. However, this would involve doubling or trebling their food resources, predominantly pastures and forages, and to do this it would be necessary to undertake an enormous program of deforestation and land development. At the moment, food production occupies about one-third of the land area of the earth. Another third remains as forest, and the rest largely consists of barren lands that are either too hot and dry, or too cold sustain much plant or animal growth at all.

In the struggle to feed the expanding world population what importance should be given to as much as possible of the world's forests and wilderness areas? Even if we set aside important questions of ethics and aesthetics, there are still compelling reasons why commercial crop and animal production should be limited to as small a proportion of the earth's surface as possible:

According to Vice President Al Gore (1992) rain forests "are the most important sources of biological diversity on earth ... as many as half of all the living species on earth find their homes in tropical rain forests and cannot survive anywhere else".

This reservoir of genes and biodiversity represents one of the greatest assets in the struggle to treble global food production. If it is to be conserved and utilized appropriately for the benefit of all, farming has to be restricted in area - which brings us to the other possible strategy for increasing animal production.

High yield production

Increases in productivity per hectare and per animal must continue, and at an accelerated rate. The importance of high yielding agriculture is well illustrated by India's wheat industry. If India had to produce its 1991 wheat harvest with its average yields of 1961, it would have required 64.1 million hectares. In fact, using the improved germplasm and farming methods that were developed between 1961 and 1991, the higher yielding harvest of 1991

required only 24.1 million hectares. Thus some 40 million hectares of "wild gene habitat" were protected by the more productive technologies.

It is up livestock industries of the future to achieve similar results. The improvements of animal production achieved during the last 50 years, combined with recent advances in the New biology, suggest that this will be possible.

For example, in many countries since the Second World War, the average number of eggs laid annually by a domestic hen has increased from 120 to more than 320, and the average milk production dairy cow, in a lactation of 305 days, has increased from some 2000 kg to more than 5000 kg. Similarly, during the last 30 years, the daily liveweight gain of pigs has increased from some 450 g to more than 800 g, and the productivity of beef cattle has increased similarly. Such genetic improvements, combined of course with a package of better nutrition, health and management, now need to be applied to all countries.

In addition, there is now the vision of new high-yielding systems based on a variety of genetically engineered livestock, including transgenetic and cloned animals, which will be inherently resistant or tolerant to diseases and pests, and will have greatly increase metabolic capacities to convert vegetation to meat or milk. Some would even have us believe that the animal of the future may be able to fix atmospheric nitrogen an use solar energy through photosynthesis. In view of the advances that have already been made in molecular biology can anything be dismissed as science fiction?

The difficulty

Although past achievements provide a basis for sober optimism, no-one should imagine that will be anything but enormously difficult to meet the challenge of the next 50 year successfully. Although many of the doomsday extravagances of some commentators have been proved false, the progress being made in the most critical areas of the world is still too slow.

The trouble is that the present pool of knowledge is too limited, both in size and distribution. In the words of Petit and Anderson (1991):

"investment in knowledge to enhance the productivity of the agricultural resource base is critical investment priority for the future ... the only feasible solution to many of agricultural growth and related economic development issues is through continued technological progress, which can only come through sustained investment in agricultural research and knowledge-related activities".

A good investment

Literally hundreds of reports have been produced from all parts of the world during the last 30 years which have calculated the economic returns from agricultural research. They have covered research undertaken on most crops and farm animals, in virtually every eco-region, in developed and developing countries. As one would expect, the reported annual rates of return from such a wide range of investigations vary considerably. At the extremes a few project gave negative returns, while others showed returns well over 100% per annum. However, the overwhelming majority of all published figures fell between 30 and 100%. Similarly, benefit: cost analyses have repeatedly shown that, for each dollar invested in agricultural research, the average return is usually between $ 10 an $ 15. It is no wonder that Mr W. Thalwitz, a former Vice-President of the World Bank, commented during his Crawford Memorial Lecture (1991) that:

"investment in agricultural research by the Inter-American Development Bank created the biggest impact the Bank had received for its development dollar, bar none-and I believe that is true for the World Bank as well"

The same conclusion has been reached by every authority in the field. No other form of investment in development has been so extensively analysed and none has shown such consistent and such high levels of return. Moreover the benefits derived from the rural developments that result from research are not merely economic. A former director of the Agriculture and Rural Development Department of the World Bank, Dr GE Schuh (1988) referred to "the true miracle of investing in agricultural research".

There is mass of historical and contemporary evidence to show that if a developing country learns how to improve its farm productivity it at once increases job opportunities, both on - farm and in those rural industries that service farmers. Then, when poor people find employment gain a regular income, they spend much of their money on food, an their health and general standards of living steadily improve. People with a job and an adequate income have smaller families, the welfare of women improves, they show concern for their environment, and they take advantage of educational opportunities. Economic and social progress throughout the whole community takes off.

Funding research

In almost every country it is advances in agriculture that initially drive the engine of national economic and social development.

The most pressing problem facing most poor countries is how to improve farm productivity. It use thought that plenty of fertilisers, irrigation water, pesticides and herbicides, combined with high yielding varieties of a few crops, and some tractors, would together do the trick. However, experience has shown that the success of these so-called industrialised technologies of farming is generally short lived and, in the end, they can lead to serious environmental degradation. The challenge of today is to learn how to produce higher Yields of crops and livestock while still conserving essential natural resources, like soil, water, forests and biodiversity which are needed for the survival of future generation. Although information on how to farm profitably and sustainably has increased in recent years, there are still many vital gaps in our knowledge, particularly in relation to the tropical soils, food staples, and local pests and diseases which are found in many parts of the developing world. There is only one way of expanding knowledge of these essential matters and, therefore, of developing the higher yielding and sustainable farming technologies that are needed to generate jobs, incomes and exports. This knowledge can only come from the processes of survey, experimentation and trial-and-error, which together constitute research. It is agriculture research that provides the sustainable and profitable technologies that are the necessary bases of better farming.

Yet, despite the fact that the funding needs of agricultural research are extremely modest in relation to most items of national expenditure, there is an inexplicable reluctance in both the South and the North to fund this vital activity. There is widespread agreement that national budgets should allocate at least 2 per cent of their agricultural gross domestic product (AGDP) to agricultural research. However, on average, developing countries are still only spending less than one half of 1 per cent of AGDP on their national agricultural research systems.

The reality is that, in many developing countries, productivity is being held back, competitiveness in the world food market is being undermined, and national prosperity is being unnecessarily limited because agricultural research and extension services are being starved of the modest level of resources that they need. Millions of men, women and children, throughout the world, are suffering lives of incredible misery and hardship because of ignorance. Until research has given the answers, nobody knows how best to develop improved farming methods which are high yielding and truly sustainable, both economically and environmentally. The resource which, more than any other, presently limits progress is knowledge.

Who knows?

The good news is that mankind's scientific and socioeconomic understanding of the world's problems is increasing steadily. Ways of managing global natural resources that are genuinely sustainable are being developed. Measurable progress is being made. The bad news is that progress is far to slow because the present pool of knowledge and understanding is still too limited, and is increasing too slowly. The main reason why mistakes are still being made in managing natural and social environments, and the economy, is that no-one knows for certain how to do it better.

Knowledge remains the most precious of all resources-but there is not yet nearly enough of it available. Potentially, knowledge is infinite and inexhaustible. Among all of the resources available for future use, it alone can be used by everyone, everywhere, over and over again, without ever losing its value or wearing out. It represents the only way in which solutions to the problems confronting the human race can be found.

The creation and dissemination of knowledge have always been two of the most sublime activities of the human race. However, it has been reported that more than 80 per cent of the world's new knowledge is currently the preserve of less than 10 per cent of the population. The Director General of UNESCO has pointed out that: "Today the gap between the poor and the rich is a knowledge gap. There can bee no sustainable development throughout the world if there is no increase in the transfer of scientific information".

Inequalities in the distribution of knowledge are already wider even than those in the distribution of wealth-and present policies are making the situation worse, not better. For example, the annual national investment in science in technology in Japan runs at about $ 1000 per person, compared, for example, with 22 cents in Nigeria. The reality is that at least 1 billion adults throughout the world are presently excluded from the benefits of the growth of knowledge because their illiteracy and poverty combine to lock them into their present state of ignorance. Among this mass of uninformed are most of the farmers, foresters and fishermen in the world. Yet those are the people we are asking to perform the extremely difficult trick of protecting their environments while doubling their food production.

Worse still in recent years, most international and bilateral agencies, including most OECD (Organization for Economic Cooperation and Development) countries, have decreased their support for agricultural research and development in their overseas aid budgets. This is all the more serious because, by any economic analysis, they were already seriously under-investing in research. Furthermore, this is a situation in which donor countries

actually do well by doing good. Many of the outcomes of international agricultural research (e.g. improved varieties of wheat, rice potatoes, maize and other crops, new methods of protecting crops and livestock against pests and diseases, and so on) inevitably benefit farmers everywhere. Also, many of new technologies which are helpful to environmental protection have important applications worldwide. Independent calculations made in various countries have shown that the benefits accruing to farmers in developed countries far exceed the contributions these countries have made to international agricultural research. Yet, despite the unusual soundness of the investment, most donor countries have reduced their support for this activity. Such policies would be short-sighted under any circumstances, but they are all the more so because, on average, OECD countries allocate less than 2 per cent of their overseas aid budgets to international agricultural research, including a paltry 0.4 per cent to support the international centers sponsored by the Consultative Group on International Agricultural Research. It has been calculated that the world's present expenditure on agricultural research each year is equivalent to only eight hour's spending on global armaments and military equipment. In view of the proven benefits to both developing and developed countries which result from agricultural research, it can only be concluded that this is an act of extraordinary oversight or ignorance.

If all donor countries now agreed to treble their support for research over the next five years, say, to about 6 per cent of their total aid budgets, they would be sending the best possible signals to all those throughout the world whose concerns are for the hungry, the poverty-stricken and the natural environment. Such an action would command the congratulations and admiration of all informed commentators - to fail to give such support can only earn the condemnation of history.

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KAKO JE SAPIENS HOMO?

Sažetak

U svijetu ima danas oko 6 milijarda ljudi. Predviđa se da će svjetska populacija doseći vrhunac na oko 10 do 12 bilijuna do 2050. godine. Većina će tih ljudi živjeti u Aziji, gdje općenito gospodarstvo cvate a osobni dohoci rastu. U kombinaciji, ovakav će razvoj vjerojatno povećati potrebe za hranom dva do tri puta u prvoj polovici sljedećeg stoljeća.

Osim toga, kako oni žive u manje razvijenim zemljama postaju bogatiji, njihovi zahtjevi za hranom visoke kakvoće, kao što su životinjski proizvodi, porast će brže nego njihovi zahtjevi za žitaricama. Iako poduzeća za proizvodnju mlijeka i mesa traže veći udio proizvoda s farme po proizvodnoj jedinici nego to traži proizvodnja žitarica, činjenica je da Homo sapiens jede sve, znači da će svjetska potrošnja životinjskih bjelančevina i masnoća naglo rasti u blizoj budućnosti.

Danas se dnevna potrošnja životinjskih bjelančevina po osobi u Aziji procjenjuje na nekih 15 grama. Međutim, neće proći mnogo godina kad će četiri milijarde Azijaca dnevno trošiti najmanje 50 grama životinjskih bjelančevina, te biti sve bliže prosječnom Amerikancu koji danas troši 71 gram. Svjetski izazov s kojim se suočavaju proizvođači stoke i istraživači životinja je podvostručiti ili potrostručiti proizvodnju mlijeka i mesa u sljedećih 50 godina.

Međutim, takva će povećanja biti moguća na globalnoj razini samo ako se osiguraju mnogo veća sredstva za nacionalna i međunarodna istraživanja te razvoj i proširenje u poljoprivredi.

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