Local farmers would be able to feed Africa if they were given the chance

Sir— Though overall food production in Africa has more than doubled in the past 30 years, it has declined by 14 per cent on a per capita basis. Many countries have now become dependent on foreign food aid and their increasing food bill constitutes a critical burden for future development. This has serious political implications, especially as a large untapped land-use potential exists in this part of the world¹.

Despite massive financial and technical assistance, the current trend is unlikely to be rapidly reversed unless the underlying reasons are better understood. Current explanations focus primarily on the adverse effects of population pressure, mismanagement of the land and poorly adapted farming practices. But in several west African countries, farmers' attitudes and incentives may be even more crucial, so appropriate government policies could really make a difference.

Agriculture in Africa is traditionally associated with low-resource production of food for local consumption. The vast population increase — on average 3–4 per cent per annum² — and the rapid development of urban centres has seriously disrupted this tradition, but has provided opportunities for a more market-oriented production. Yet, except in the immediate neighbourhood of the new centres, very few farmers have taken up this opportunity. In the more remote areas where most of the untapped potential is located, agricultural production has remained low and stagnates at subsistence level. This is not surprising because farmers in these poorly accessible areas have difficulty in transporting their goods and have no incentives to produce beyond their direct needs.

In Sierra Leone, for example, average yields for upland rice — the country's staple food — have dropped from 700 kg per hectare in 1978 to 516 kg per hectare in 1992. This is mostly explained by increasing population pressure: the length of the fallow period is shortened and the soil nutrient status depleted, further reducing yields. In rural areas, field observations indicate that instead of population pressure there is a shortage of labour, owing to the massive migration of younger people to the urban and mining centres. But this leads to similar results: land is reclaimed after a fallow period of, say, four to five years instead of the traditional 12 to 15, when forest regrowth would be denser and harder to clear.

At Freetown market in 1995, a bag of

imported (and subsidized) rice cost 280 leones (roughly \$26) compared with 320 leones for the locally produced rice. Though the latter is of high quality and suits local tastes, it cannot compete with the cheaper imported product.

The main reasons for this price difference are structural and beyond the farmers' control. For example, the poor interior road system increases transport costs, farmers are overdependent on middle men and there is no mechanism for setting a fair price. As a result, inland farmers are not interested in producing more than their families need and young people have no incentive to stay in rural areas.

The solution, nevertheless, is simple. If local farmers can compete properly with imported goods, they can take a share of the growing demand. This requires the government to support indigenous farmers by abandoning its subsidy policy for imported food products; to improve the interior road system, permitting easier transport of local products to the markets; and to support fair-price setting.

These proposals are similar to agricultural policies in western free-market economies. To the individual farmer, they will provide incentives for a higher return and should encourage better use of the land, ultimately improving farming practices. Gradually, producers will think of themselves as part of the internal economic market system rather than as poor subsistence farmers without any social status. At the national level, such policies will reduce the income gap between urban and rural areas and may reduce migration to the cities, as well as leading to a lower external food bill.

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1. FAO World Soil Resources, an Exploratory Note on the FAO Soil Resources Map at 1: 25 Million Scale: FAO World Soil Resources Report 66 (FAO, Rome, 1991).
2. United Nations Development Programme Human Development Report (Oxford Univ. Press, Oxford–New York, 1999).

Ancient Chinese had their fingers on the pulse

Sir— In his Millennium Essay "Where do babies come from?" Roger Short calls William Harvey's seventeenth-century *De Motu Cordis et Sanguinis in Animalibus* "the first accurate description of the circulation of the blood".

Readers may be interested to know that such a description existed in the Chinese medical treatise *Su Wên*, written in the second century BC. It covered circulation of both blood and, in different channels, *qi* or *chhi* (roughly translated as 'vital energy',

with no equivalent in Western science). As science historian Joseph Needham² writes: "We can find statements such as this in the *Su Wên*, where Chhi Po says that 'the flow in the tract and channel runs on and on, and never stops; a ceaseless movement in an annular circuit...' Clearly the circulation of the blood and *chhi* was standard doctrine [in the second century BC]".

The heart's pumping function was also known. Needham writes: "In the *Lei Ching*, Chang Chieh-Pin wrote: 'The heart and pulse (*mo*) is not itself either *chhi* or blood (*hsüeh*), but rather it is the bellows of the *chhi* and the blood'. Chang published his compendium of medical physiology four years before *De Motu Cordis* appeared.

The ancient Chinese also wrote that 50 complete circulations of the bloodstream would take one day². Needham even suggests a mechanism by which they could have estimated the time required for one complete circulation, which, given the experimental spirit of the ancient Chinese, seems a reasonable conjecture. No concrete evidence of such experimentation has been found so far, probably because blood circulation was not of paramount interest to Chinese physicians compared with the circulation of the *chhi*.

Some seventeenth century European texts referred to Chinese descriptions of blood circulation. But since then, a misunderstanding has arisen that Harvey was the first to describe this process.

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1. *Nature* 403, 705 (2000).
2. Needham, J. & Lu, G. D. *Celestial Lancets*, 29–32 (Cambridge Univ. Press, Cambridge, 1980).

No pie in the sky, thanks

Sir— Geoffrey Cantor has overlooked the reason why many scientists perceive a conflict between science and religion, in his Millennium Essay "Fighting the wrong battle" (*Nature* 403, 831; 2000). Science is an enterprise whose proponents attempt to arrive at the truth by reasoning from experiment and observation. Religions rely on beliefs for which there is no support other than the dogmatic statements of sacred writings or clerics, and which are often imposed on the populace by force.

It is ludicrous to maintain that there need be no conflict between such fundamentally opposed activities. If the human race is to survive the next millennium, we need to face reality, not delude ourselves with fairy stories.

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