

## LESSONS FOR ALL FROM THE SO-CALLED “DEVELOPING” WORLD

By Professor E.R. (Bob) Ørskov

I have been asked by Colin to write a few comments about my experience in rural development in different parts of the world – and this is not easy! If he asked me to write about animal nutrition I feel I could claim some expertise – but you never become an expert in rural development. Yet I have had the privilege of working with many international organizations such as FAO, IAEA, DFID and so on – in fact for the past 25 years or so I have on average visited 10 countries each year in Asia, Africa and South America. It's a continuing learning process because there is never a common solution to all problems but there are some common themes – which are roughly as follows:

### **Developed versus developing countries: “Don't copy us!”**

In so-called developed countries over the past 50 years or more agriculture has been driven by cheap fossil fuel, substituting for labour. On arable land this has led to monoculture supported by herbicides and pesticides, which in some countries has now been transformed into genetically-modified herbicide-resistant monoculture. This approach has produced high yields but it has also greatly reduced the organic matter in the soils. Fossil fuel is not renewable and supplies are limited so chemical fertilizer becomes increasingly expensive – and yet as organic matter is lost from the soil more and more fertilizer is needed to make up for the loss of fertility. Increased CO<sub>2</sub> in the air is making the world warmer, with unpredictable consequences. Our agriculture is clearly unsustainable – yet we claim that industrialized countries like ours are “developed”, implying that we have arrived at some desirable end-point. The countries that have not yet westernized – in Africa, Asia and South America – we call “developing”, implying that they are or should be on the way to becoming more like us. There is a huge contradiction here.

In fact I feel very strongly that we should stop speaking of “developed” and “developing” countries. This terminology is used particularly by large multinational agribusiness companies and other organizations as a corrupt method of pursuing trade: “You want to be developed don't you? So use the technologies and methods that we are using in developed countries! Use our improved animals – like Holsteins -- because they can yield much more milk than your native cows.”

But Holsteins and their like need a large proportion of concentrate to get enough feed to support their high yields and in tropical countries their feed intake is limited by their ability to dissipate surplus heat – for at least 50 per cent of the digestible energy has to be dissipated as heat. Farmers in tropical countries can put their high-yielding imported cattle into air-conditioned houses as is sometimes done in the Middle East, but few can afford this. Yet the export of “improved” animals from so-called developed countries goes on and on.

In my work of rural development in so-called developing countries I keep on saying – “Do not copy us! Our system for arable agriculture is not sustainable! If there is anything to copy, then be very critical!” Occasionally, too, so-called developing countries use this as a way of begging for support: “You must help us to be developed!”

So let us stop using this terminology. It is misused -- to the detriment of so-called developing countries.

### **The principle of “Complementary Multiculture”**

In Asian countries like Indonesia, particularly the Island of Java you see a great deal of what I like to call “complementary multiculture”. There is a great deal to be learnt from it.

Complementary multiculture typically combines non-leguminous crops with leguminous crops. Cassava is often grown as the non-leguminous crop, and normally takes one year to grow good roots. But the cassava plants are typically grown one to two metres apart – and between them grow groundnut, soya or other leguminous crops. In many areas leguminous trees like *Sespania* are grown along the edges of other crops, and their leaves and branches are fed to goats in a cut and carry system. Similar systems are employed in many places such as Kenya – as in Kismu, where I have seen such farming for myself. Of course in such systems you cannot use combine harvesters but labour is not a problem so labour-saving, fossil fuel-demanding equipment is not needed. Communities often harvest their crops together.

These systems are sustainable, and are good for the soil -- unlike our fossil fuel driven monoculture. Yet in many areas little research has been done to determine the optimal density of the different plants. To get the best information, one has to ask the small farmers rather than the university researchers. Many research people have received western type education and done their research mainly or exclusively with

monoculture. In multicultural systems, cattle or goats receive the by-products -- cassava leaves, groundnut tops and so on, often on a cut and carry basis. The manure is spread on the fields. Sometimes small amounts of artificial fertilizer may be used but artificial N is seldom added because this is supplied by the leguminous component. Each family may well own less than 1 hectare of land.

### **Multiculture with rice, duck and fish**

In Vietnam and parts of China multiculture takes a very different form -- rice or paddy field with ducks doing the weeding and consuming at least some of the parasites. The ducks may also receive some extra feed at night and excrete this into the paddy field -- so there is a net gain in nutrient and plankton develops and fish can be introduced. So the paddy fields become triply productive. In the trial I was involved with in Vietnam, the yield of rice itself increased when ducks were introduced and the farmers' income per unit area increased by 20 times. Labour-consuming, yes -- but sustainable. Yet even with this example before them, western companies were still recommending herbicide-resistant rice.

### **The absolute importance of Agroforestry**

Many countries -- not least the poorer countries -- could make far more use of livestock in agroforestry. Very often I have observed cattle grazing under trees such as mango, and in Sri Lanka in particular one sees cattle grazing under coconut trees. But there was no information to show how the livestock affected the yield of fruit -- so we started a project with the coconut research station to generate data.

We introduced cattle at very high stocking density into a defined area of coconut trees -- just to graze, with no other food available. The perceived productivity of the cattle was low, with low milk yields and long calving intervals -- so one could perhaps conclude that this did not work very well. But the yield of coconuts increased by more than 15% -- just through grazing alone. So far as we can see this is because the cattle raises the organic content of the soil, and this increases the water-holding capacity. So the greatest yield from the cattle came not from the animals themselves but from the trees. You have to look overhead to see what the animals are really contributing! If you did not look or measure you would assume low productivity. If now the cattle were fed rice straw from outside or -- even better -- rice bran, then both coconut yield and cattle production increased. Of course, feed from outside increases the

available N, P, and K so we would expect to achieve higher yields all round. My biggest surprise was that grazing alone increases the yield of coconuts.

Sri Lanka raises an interesting sociological point, too. In Sri Lanka the owners of the coconut trees are generally not the owners of the cattle. But the owners of the coconut trees allow the poor farmers to graze their animals under them. They probably had a good idea that they are benefiting though this was not measured.

There are many more examples. Some years ago in Malaysia they studied the effects of grazing goats and cattle in oil palm plantations. With grazing, there was always a consistent increase in yield of oil palm even with full canopy. The experimenters provided no data on the reason why but probably, as for the coconut, it was because the soil organic content rose, with increase in water-holding capacity.

I became involved in similar issues with research people from Gadjah Mada University in Benkulo, Sumatra, Indonesia. Here the owners of the oil palms had given a single head of cattle to the collectors of the oil palm bundles. Normally the bundles are carried by workers to a driveable road and then taken to the oil extraction factory. But with one head of cattle and a little truck they could put 10 to 20 bundles on it which increased the capacity of each worker by 50 per cent. The beast that pulled the truck fed largely on fronds from the oil-palm bundles – and the workers soon realized that there was far more of this feed than the draft animal needed. So now when the workers come in the morning they often bring 10 more cattle with them, while just one is pulling the truck. Now it has been calculated that it's possible to feed two head of cattle per hectare even under a full canopy – so Indonesia could be keeping 10 million native cattle on its 5 million ha of oil palm plantation. At the moment Indonesia is importing cattle from Australia for fattening – yet they could be exporting cattle. But the big oil palm plantations are mostly owned by large companies who presently are not too concerned. We may hope that they will be so in the future.

In Cuba I saw yet more systems -- including rows of leguminous trees of the genus *Leucaena*, with grass in between. In the wet season the cattle were eating grass supported by N captured by the trees. In the dry season branches of the trees were cut to supplement the grass. These principles are not unique to tropical or subtropical regions. In Scotland Allan Sibbald did work with sheep grazing under trees compared with grazing on a similar area of land without trees. The sheep did better under the

trees particularly in years with low rainfall. No doubt as a result of water holding capacity of the soil under the trees.

So much research needs to be done on all aspects of such enterprises: type of trees, optimum density of livestock, and so on. But little such research is being done. Agroforestry is vital but knowledge of it largely remains ad hoc.

### **Small scale farming in Asia and Africa**

In most of Asia and Africa more than 60 per cent of the people live in the countryside as farmers or farm workers and so on. As a generalization, we can say that in Africa the poorest people tend to live in the countryside while in Latin America the poorest people may be found in the large cities, such as Mexico City (although this is only a generalization). The technical problems, if any, vary from place to place according to climate, soil, culture, gender issues and so on -- which is why no-one can ever become an expert in rural development; all of us, always, are on a learning path. Yet there are a couple of general principles.

First of all, in general, small scale farming cannot on the whole be treated simply as a business. It is a way of life.

Secondly, small scale farmers cannot take risks.

In general, subsistence farmers are poor – but subsistence farming tends to be more sustainable than our fossil fuel driven monoculture. Around many cities in so-called developing countries, there are often large farms to supply food to people and feed for animals which must be transported for large distances – as in Damascus, Tanzania, Khartoum, Guangzhou, Karachi, and so on. Why not transport animal products instead of feeds?

But can small farmers be encouraged to produce more to support their cities? Yes indeed. In my humble experience they can produce a great deal more -- *but it has to be recognized that they cannot take risks*. If risks are removed they can often respond faster than large scale farmers to increase production

So I recall that after Zimbabwe gained their independence from the UK, there was widespread starvation due to a lack of maize. The government then underpinned the price of maize and the next year Zimbabwe was exporting grain! This was not due to the response of the white owners of

the large farms but rather the small communal farmers who could now take the risk of investing in fertilizer, knowing they would get a guaranteed price for their product. Small farmers cannot tolerate fluctuating prices.

Here the organizations such as WTO are less than helpful. By insisting on “free trade” they allow prices to fluctuate. But free trade so often is not fair-trade and the small farmers are put at a serious disadvantage.

In Sumatra, too, recently, I came across the same principle again. There, the Indonesian government stimulated small farmers from Java to establish small oil palm plantations, called “plasma farmers”, each working around 2 hectares. But then they were compelled to expose the palm oil to world prices -- which fluctuate. Accordingly, production from the small oil plantations has gone down – because the farmers cannot risk buying fertilizer when they don’t know the price they will get. But the large-scale farmer can afford such risks.

So what must be done to encourage small farmers to produce more of much needed products, to be sold at good prices? Obviously there is no one solution but here are a few proposals:

Encourage the formation of cooperatives – these have to be with the participation of the whole of a local community – developing from the bottom up rather top down direction. I grew up in a village in Denmark where 100 small farmers delivered milk to a cooperative dairy, so I know this can work! I have seen many small cooperatives in different places, for example in Indonesia and Kenya where goats provide various dairy products that are in demand in the city. Farmers in these cooperatives can now trade from a position of strength as the large scale farmers do – no longer at the mercy of the middlemen. In this, the mobile phone can be of key importance, because it makes it possible for individuals and communities to be in direct contact with the shops they supply. Here we see another key principle – that “appropriate technology” for poor communities can, in practice, mean very high technology (although generally small in scale). Strong communities make very strong cooperatives -- especially where many local women are involved.

Rapid and reliable transport is vital too, if local products are to be marketed effectively to the surrounding population. Often the product to be marketed can be determined by the time required to transport it: fresh milk near the town, soured milk a little further away, then cheese, and so on. The method of preservation has to be matched to the time taken to

reach the market. In the Ethiopian Highlands the average distance to a driveable road is 50km. Obviously the nearer the farmers can be to the road the better off they are likely to be.

### **Livestock as the Banking System – and the special importance of goats**

With small farmers in Asia and Africa livestock is truly multipurpose – not merely single or maybe dual-purpose as in so called developed countries. Livestock on the whole serve for risk minimisation rather than for profit maximization. Often in effect the biggest product of livestock is “security” -- or as a farmer in Zimbabwe once told me, “They are our shield.” If you ask a small farmer in Indonesia when he will sell his goats it is never “When they reach a certain weight” but rather, “When we need money for medicine or school fees etc.”

Why not use banks? Well if I was I those countries I wouldn't either. For most their livestock is their safest bank! It is also important to understand that in many areas sheep and goats predominate over cattle in order to spread risk – if you have six goats and lose one, you still have five left. If you have invested in one cattle beast and you lose it you have real problems. We have been exhorted to “Send a cow to Africa!” -- but it is better to send six goats or a flock of ducks or hens. [It has sometimes been suggested that goats are bad because they wreck the landscape – but they don't if grazing is controlled, and often in Third World countries goats are tethered.]

But once again we tend to look with Western eyes and equate low milk yields or growth rates with low productivity, disregarding all the other products of the animal. I remember once speaking to a group of agricultural students in Iran and told them that if they saw a farmer who had two Holstein cows they probably did not belong to him – because this would be a very risky way to live. One student put up his hand to say that he knew someone who did own two Holsteins. I asked how far away this was as I would like to meet him. Being assured it was not far we arranged to go the next day. Sure enough here was a young farmer with two Holstein cows. My first question was “Do you have another job?” “Oh yes”. came the reply. “I am a teacher”. No more questions– he had his security!

### **Organic farming**

I would finally like to add a couple of comments on organic farming which is a bit closer to home and is promoted by many people and in particular by the Soil Association. The economics of organic farming are often questioned. While there is no doubt that food produced by such methods is very safe it is sometimes difficult to prove when challenged by producers of artificial fertilisers, pesticides and herbicides who are eager to promote the use of their products.

But in my opinion there is one aspect that is not yet receiving sufficient emphasis but may well come to the fore in the near future – the question of carbon sequestration. There is no doubt that organic farming promotes higher carbon content in the soil. As the effects of climate change come ever closer farmers will, no doubt, be paid, so to speak, to grow carbon -- thus encouraging an increase in organic farming. Maybe the costs of production are higher but yields can be maintained and if the costs of carbon sequestration are taken into account such farming becomes more financially viable. Good luck to the organic movement!

## **Conclusion**

I have touched on many aspects of farming with emphasis on Asia and Africa and have the privilege of travelling to many parts of the world trying to assist in rural development. I consider myself to be still very much on the learning ladder but some principles are abundantly clear to me -- and these are the ones I have addressed here.

*E R Orskov, Macaulay Institute, Aberdeen, November 2009.*