Agriculture and Health

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The development of Agriculture was one of the greatest developments in human prehistory around 10 000 BC leading to improvement in health and survival after the stone age. The crucial events were the domestication of 10 plants of which 5 are the major staple foods of today: wheat, rice, maize, potato, cassava with the other 5 also being important more locally: sorghum, millet, sweet potato, yams and plantains (cooking bananas). Ten animals were also domesticated: cow, horse, sheep, goat, pig, camel, lama, chicken, duck and turkey. Over the last 4000 years no new animal or plant has been domesticated with a global impact.

Of all the sectors that have an impact on health, agriculture is one of the most important but it may be also one of the most difficult to change radically when poor communities are themselves farmers with a long convention of doing things in a certain traditional way. It is essential to study very carefully the traditional thinking and to see which food preferences and taboos may affect any plans to bring change. The soil, climate and pests such as the presence of tsetse flies may limit the scope for change.

Beware of introducing change through top-down initiatives. Any major changes in farming methods and crops or animal/fish husbandry must be introduced with long community counselling sessions and when pilot projects have shown clearly that the change is feasible and affordable in this area and with this community. A gross example of how this can go badly wrong was in the North-West of Zambia where some nutritional and agricultural experts from Europe came to the area and saw that the staple of most of the community was cassava. They came to communities with a strong recommendation to change this staple for maize as this had a better protein score (cassava is almost pure starch) and many in the community tried to follow their advice. The result was a disaster as the soil was too sandy and poor for maize without huge amounts of fertilizer which no-one could afford, and even what they could afford was washed through the sandy soil and soon lost. The crops failed badly and after a few years the same experts came back and admitted that they had been wrong and recommended that the people should go back to cassava which was the most suitable crop for the area. It is the best converter of the energy of sunshine into food calories. However it must be supplemented with a relish with a good protein score to make up for that lack in the staple. A by-product of this mistake was that the people had now developed a taste for maize which then had to be imported into the area and this cost extra money.

The absence of the infrastructure for marketing the products of farming may limit the scale of making this an income-generating activity.

The types of farming that are well known are as follows:

1. Subsistence farming. This is where farming is at a level that it is only for the immediate needs of the family/community without capacity for selling any surplus. In many parts of rural Africa this has traditionally been in the form of shifting cultivation or “chitemene” with soil being used for 4-5 years and when it loses its fertility, the fields are abandoned and the village moves to a new setting, cutting down virgin forest, burning, planting the first crop in the ashes and then starting again.

2. Improved subsistence farming. This is when better cultivation is introduced using e.g ox-ploughing instead of hoeing only or adding fertilizer or improved seeds. This may give a significant surplus of crops that can be sold. In Zambia a well founded study looked at four methods of cultivation used in improved subsistence farming:

a. Hoeing alone
b. Ploughing with one's own ox
c. Ploughing with a hired ox
d. Tractor

They did very careful cost-effectivity studies which showed that the only method that made a profit for the farmer when work-costs were included was ploughing with one's own ox. Hoeing alone was too labour-intensive and therefore cost-ineffective, hiring someone else's ox was too cost-ineffective because you got the ox late in the planting season when the owner had finished his ploughing and planting work and the ox was tired and therefore ploughed ineffectively and the maize did not have a full growing season. Tractor use was cost-ineffective because at this level all the chance of a profit was swallowed up by the cost of fuel, spares and payment on the loan for the initial purchase. The scale of farming was too small to make this profitable.
Crop rotation can sometimes make a big difference to the output especially including a legume which binds nitrogen from the atmosphere and makes it available for fertilizing crops.

3. Adding a new crop or animal/fish husbandry. Such examples may include the introduction of soya beans, fish farming or small animal husbandry combined with vegetable growing as in the "Butchershop in your backyard" scheme. Improved races of cattle or goats or sheep or camels may make the output in terms of milk. and meat and wool or hides much better. An example of using microfinancing for getting hold of improved races of cattle or goats is from Bangladesh and from Vellore in Tamil Nadu, India. There are very good examples of linking farming communities in high-income-countries with those in poor countries with the donation of breeding stock or milk cows of a type that will increase production of milk significantly e.g. linking farming communities in England with those in Uganda. Bee-keeping is in some areas one of the best extra activities to bring in profit but this depends on marketing being available locally and adequate training with use of modern appropriate methods of bee-keeping.

4. Monocropping using better seed, fertilizer and specializing in one agricultural type such as maize or a commercial crop such as cotton or tobacco. This is often the standard method for large scale commercial farmers but is very dependent on high levels of fertilizer, pesticides and skills in farming, financial control and marketing.

5. Improving monocropping by adding inter-cropping e.g. maize inter-cropped with groundnuts or planting lines of trees that act as a windbreak but may also stop erosion and if chosen carefully may improve the soil quality. It can also minimize exposure to pests and diseases since neighbouring plants are less likely to be of the same species. There is suppression of weeds. The use of available soil moisture and plant nutrients is maximized. Different plants e.g. maize and cow-peas have complementary requirements and roots at different depths. Plants with different growth characteristics and leafing patterns may be able to combine and maximize use of available sunlight, rather than compete, as would be the case where plants of a single species are planted in denser stands. The risks of crop failure are minimized e.g. due to drought since different species

with different requirements for moisture and growing length can complement each other and one may survive when the other is damaged by drought.
A good example of intercropping saving a disaster situation was in Westen Kenya where 80% of the maize crop was being lost to the stem borer moth. By planting napier grass around the periphery of the maize field and then rows of molasses grass between the rows of maize there were far fewer stem borers in the maize but greater numbers of parsitic wasps that prey on stem borers. This gave protection against the pest and a valuable crop for cattle fodder with a 30% increased maize crop.
Another intercropping success story is silver leaf which is a South American legume that fixes nitrogen and keeps away weeds when intercropped with maize. The maize gave 5 tons/hectare instead of the expected 1-2 tons and also gave a valuable fodder for cattle. It is now widely used in Kenya, Tanzania and Uganda.

6. Green revolution where improved seed varieties plus fertilizer plus better cultivation methods are combined with a wide-spread extension programme and better transport, marketing and loan facilities for farmers.

7. Highly mechanized. This is the level in many high income countries with large agricultural exports but it is enormously expensive to establish and run and needs great expertise in many fields with a highly developed infrastructure. In the end crops can be produced which can be cheaper and become an industrial scale product. However many countries that point to the advantages of this kind of farming still give considerable subsidies to this industry. Many will be run by multinational corporations.