

Working paper: agricultural production and the potential for commodity chain expansion in the three northern regions of Ghana in 2006

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Although the system of agriculture is “fixed”... it leaves much to be desired. Farming methods have not been adjusted to keep pace with the growth in intensity of conditions. Farming is regarded as a custom and not as a business, with the result that in crop production and in animal husbandry the maximum is left to nature.

Lynn 1937:10

1. Crops, livestock and agricultural systems in Northern Ghana

1.1 Overview

1. **The Northern Regions of Ghana** are situated between 8°-11° N latitude and 0°-3° W longitude. Administratively they comprise Upper West Region (UWR), Upper East Region (UER) and Northern Region (NR). Northern Region is the largest region in Ghana, comprising 41% of its land area, but has the lowest population density of all ten regions. Tamale is the administrative headquarters of the Northern Region and by far the biggest town in Northern Ghana.

2. **Cultivation systems in Northern Ghana** reflect variable population densities. Until recently, shifting cultivation was dominant in much of NR and UWR; villages moved within a demarcated zone, clearing the woodland, farming for some years and moving on. Trees in the bush and preserved on farms were the property of the chief or earth-priest and could only be harvested or cut with their permission. More recently, bush-fallow systems have become predominant as owners invest in construction and transport infrastructure requires that villages be sited along roads. Some areas of UER, the Tamale-Nyankpala corridor in NR and around Lawra in UWR have shifted to permanent cultivation. In UER, the regions of permanent cultivation are not close to large towns but are associated with remote rural areas and ‘compound farming’. Dams and dugouts with associated dry-season cultivation are present throughout the region but still contribute only a small proportion of agricultural output. Natural floodplain cultivation and flood-retreat systems exist but are still very low-level. The use of small pumps along river systems for dry-season gardens is becoming more common but still remains sporadic. Large-scale mechanised farming has had no long-term impact in Northern Ghana.

3. **The cropping system** in the north of the region is based around rainfed dwarf millets, cucurbits and pulses which would normally be encountered in lower rainfall zones elsewhere. Animal traction is extensively used in UER and sporadically elsewhere, but rarely to throw up ridges that could improve rooting and counteract erosion. The early millet is interplanted either with late millet or sorghum in fields close to the compound where fertility is highest. Residual crops still grown in this area include Bambara groundnut, Kersting’s groundnut and Frafra potato. Maize underwent a burst of popularity during the period when fertilisers were available at subsidised rates and then fell in popularity. More recently it has begun to recover and recent statistics show high planting rates. Rice (*Oryza sativa* not African rice) is planted in swampy lowlands. Further south in UWR and NR, rainfall is adequate for vegetative crops and yams are a common staple.

4. **Appendix 1** presents a list of some fifty crops, wild plants and livestock species exploited in Northern Ghana. The agronomy, potentials and marketing chains of some of these are well-known, others not at all¹. This list has been elaborated based on local and/or international market potential or

¹ Lessons from LACOSREP and UWADEP suggest that claims by research organisations to have worked on crops are not always substantiated by their outputs.

import substitution capacity. Information on women's versus men's crops, irrigated versus rainfed crops, existing demand and research needs are included.

1.2 Crops

The crops listed are numerous and not all can be discussed here at length. This section presents some examples, drawing particularly on those which appear to have potential to increase farmers' incomes. Scientific names, local names and other information is present in table form in Appendix 1. World trade statistics on most of these crops are highly inadequate, for example, aggregating all the yams or millets, which is virtually useless when assessing potential market demand for specific Ghanaian crops.

1.2.1 Rainfed crops

Rainfed pulses and oilseeds: women's crops

5. Pulses and oilseeds are grown on a small scale in Northern Ghana, principally by women. The main pulses are Bambara nuts, Kersting's groundnut groundnuts, cowpeas and pigeon-peas. In recent years, the soy-bean has been introduced from SE Asia and is gradually spreading.

6. Cowpeas are widely grown in northern Ghana as an ingredient of soups and snack foods². However, local production is inadequate to meet market demand³ and is of low value compared with imported varieties from Nigeria and Burkina Faso. Poor cultivation and storage techniques and low-productivity cultivars lead to high rates of weevil infestation and long cooking times. This can be countered by adopting new cultivars combined with the application of simple non-toxic pesticides (neem etc.).

7. Other women's crops include sesame and *nere* (melonseeds). International demand for sesame oil is growing as Middle Eastern countries, once producers are now becoming consumers. Sesame plants in Northern Ghana are mainly grown for their mucilaginous leaves so farmers wishing to take advantage of new demands must switch cultivars. It is likely that most of the sesame seeds could be expressed locally.

Sorghum and millet: rainfed cereals

8. Cereals research in Ghana has mostly concentrated on maize, leaving traditional cereals such as sorghum, millet and fonio as orphan crops. Pearl millet is the most important cereal crop in arid and semi-arid regions of the world, and is nutritionally superior to rice and wheat. Yields in Ghana are very low due to poor soil fertility and cultivation techniques. Nonetheless, millet can flourish without inputs and resist low and uneven precipitation and in many ways is ideal for the situation in the drier

² FAO stopped publishing cowpea statistics in mid of 1980s, and there is no reliable source of international statistics on cowpea production or marketing.

³ During the 1990s, Nigeria was cultivating ca. 3.5 million hectares of cowpeas and Ghana just 85,000 ha. resulting in significant deficits and consequent imports from other West African countries.

areas of the North. Market demand is now rising, especially for ‘*koko*’ varieties suitable for gruel (thin porridge) and millet flour is being imported from Sahelian countries. New market requirements for sorghum include ‘dorado’ varieties for stout brewing; pilot outgrowing schemes are under way in the Tamale area, but this clearly has considerably greater potential. Increased productivity can be achieved through better cultivation techniques (cf. soil and water conservation); the marketing chain is short because the brewers buy direct from Tamale entrepreneurs.

9. Lesser-known cereals, such as fonio (*Digitaria exilis*), are grown in the northeast of the region. Like millet, fonio grows best on depleted land and can resist drought. As an ingredient for breakfast porridge it has considerable potential if appropriately allied with market promotion both on the national and international markets. New low-technology fonio dehuskers have been developed in other West African countries and could be tested in Ghana.

Tubers

10. The main tubers grown in Northern Ghana are yams (*Dioscorea guineensis*, *D. bulbifera* and *D. alata*), cocoyams (*Colocasis esculenta* and *Xanthosoma mafaffa*), Frafra potato (*Plectranthus esculentus*), sweet potato and cassava. Cocoyams, sweet potato and cassava are produced to supply the local northern market but are unlikely to have a competitive advantage in regional or international exports because they flourish in high humidity zones and are widely grown further south. Frafra potato and aerial yam (*D. bulbifera*) are little-known outside the region but certainly have considerable potential for export to expatriate northern communities as ‘home’ food. They are undoubtedly also candidates for international promotion, where niche markets can be developed. Guinea yam⁴ and water-yam are already exported from the Northern regions to Accra and even internationally to a limited extent. Since the North has a competitive advantage due to available land (in NR and UWR), labour and since yams are storable they represent a crop with considerable potential to increase incomes and margins.

Roselle

11. Roselle (*Hibiscus sabdariffa*) is a well established crop that tolerates dry Sahelian conditions and is very drought resistant. It is grown mainly for the edible calices which are used as a soup ingredient. However, in the Sahel, ‘red’ cultivars are grown to make a refreshing drink and these are currently only a marginal crop in Ghana, although imported calices are for sale in every market. World demand for roselle (often sold as ‘Hibiscus’) has been rising sharply in recent years, as have prices and other African countries (notably Sudan) have benefited from these increases. China and Thailand are the dominant world suppliers, although their humid climates are far from ideal. Meeting international standards for roselle is not onerous, soil and water demands are not intensive and there is a strong case for import substitution and then international export.

1.2.2 Irrigated crops

12. The gradual expansion of irrigation in Northern Ghana has increased availability of dry-season crops. Tomatoes, onions and rice are the most well-known crops but ‘new’ or less usual crops such as water-melons and chilis are often more profitable for producers, due to the absence of cartels.

⁴ Most of the world production of yam is from Africa (about 96%) with Nigeria alone accounting for nearly 75% of the total world production.

Tomatoes and onions are less of a priority as they are well-known irrigated crops with established marketing chains. Substantial quantities are imported from Burkina Faso to make up for market shortfalls. However, they are extremely perishable and thus wholesalers' cartels can operate to force down producer prices⁵. Okra and chili peppers have many highly diverse cultivars in Northern Ghana and have a proven unfulfilled export demand to Europe, mainly due to Asian and African diaspora. The price of irrigated crops can fluctuate markedly during the dry season and recently producers have been able to take advantage of mobile phones both to check market prices and to arrange transport once they are aggregated.

1.3 Fruit trees

13. Fruit trees were not traditionally grown in this region; wild trees were protected and exploited according to traditional notions of ownership (§1.4). Fruit tree species such as mango and papaya have spread into bush areas and are now widely gathered, although the quality of fruits is very low. Forestry departments, NGOs and donor schemes have all spread exotic fruit trees in recent years, notably citrus, guava, cashew and others, mostly through the sale of seedlings. These have made a contribution to soil and water conservation and local marketing, but quality is too variable for long-distance trade.

14. An experiment is under way to produce irrigated organic mangoes in Northern region⁶ through a combination of direct production and outgrower schemes. This has benefited from substantial donor subsidies and has not reached the payback period, so it is difficult to judge whether it is truly economically viable. Outgrowers are subject to very intensive supervision at a level that would not be economically feasible in NRGP. Mango might also be a strange choice given that it is grown on a large scale in more humid areas, admittedly with high pesticide inputs. However, the maturing of an organic certification programme could benefit other crops grown in the region and might be a model for expanded small-scale irrigation.

15. **Tropical fruits** have both higher storage and transport costs and higher spoilage rates, so their suitability for long-distance trade from the North can be questioned. However, there may be opportunities for subregional trade; just as pineapples and palm-nuts are sent north from Southern Ghana, there may be opportunities for export to Burkina Faso and other Sahelian countries.

1.4 Wild and protected plants

16. **Economic trees.** Farmers in all areas of Ghana leave economic trees in their farms, usually referred to as 'spontaneous' or 'protected'. The convention is that the owner of the land has rights over the produce of these trees unless he has otherwise ceded this right. Trees in 'the bush' are generally considered free for anyone to harvest. In a few areas, major trees, such as dawadawa, belong not to the farmer but to the chief who has the right to harvest them and give a portion to the farmer. The most important of these trees are shown in Table 1;

⁵ Ironically this is happening with supermarket chains all across the developed world and is seen as a benefit of competition. Curious, then that we should be opposing it in Ghana, where it also reflects women's empowerment.

⁶ Irrigated Tamale Fruit Company (ITFC)

Table 1. Economic trees left on farms

| | |
|-------------------|--------------------------------|
| Locust = dawadawa | <i>Parkia biglobosa</i> |
| Shea | <i>Vitellaria paradoxa</i> |
| Kapok | <i>Ceiba pentandra</i> |
| Baobab | <i>Adansonia digitata</i> |
| Whitethorn | <i>Faidherbia albida</i> |
| Tamarind | <i>Tamarindus indica</i> |
| Jujube | <i>Zizyphus mauritiana</i> |
| Black plum | <i>Vitex doniana</i> |
| Monkey guava | <i>Diospyros mespiliformis</i> |
| Mango | <i>Mangifera indica</i> |
| Teak | <i>Tectona grandis</i> |
| Neem | <i>Azadirachta indica</i> |

17. **The principal plant products** collected for use and sale are the fruits of trees. The main products from economic trees are shown in **Table 2**;

Table 2. Principal uses of economic tree species

| Name | Scientific name | Part used |
|--------------------|--------------------------------|---|
| Locust = dawadawa | <i>Parkia biglobosa</i> | Seed, powder, pod |
| Shea | <i>Vitellaria paradoxa</i> | Fruit eaten, kernel processed for oil |
| Kapok | <i>Ceiba pentandra</i> | Lint sold for stuffing cushions etc. |
| Baobab | <i>Adansonia digitata</i> | Seeds sold for flavouring, young leaves eaten |
| Jujube | <i>Zizyphus mauritiana</i> | Fruits sold fresh and dried |
| Tamarind | <i>Tamarindus indica</i> | Pod sold for flavouring |
| Black plum | <i>Vitex doniana</i> | Fruit sold for eating |
| Monkey guava | <i>Diospyros mespiliformis</i> | Fruit sold for eating |
| Mango ⁷ | <i>Mangifera indica</i> | Fruit sold for eating |

18. Of the protected species that are currently exploited and for which demand is high, the shea, *Vitellaria paradoxa*, is by far the most important. Shea fruits are sold both as nuts and butter, for which international demand is rising rapidly⁸. Value can be added to shea-nuts through better processing and better access to the resource. Improved processing could result in more nuts sold in butter form and the butter turned to oil and livestock feed. In addition, most shea-nuts lie uncollected in remoter areas and as shea is a women's crop, it is difficult to access these. Availability of donkey carts would increase their ability to harvest remoter trees. Carts would also make possible the collection of firewood (thereby reducing peri-urban deforestation) and other bush products, medicinal plants etc. Similar possibilities can be envisaged for fruits from the dawadawa tree (*Parkia biglobosa*), baobab fruits and other wild resources.

⁷ Mangoes are regarded locally as found in the bush, although they all derived from imported materials.

⁸ Body Shop already buys 240 tonnes of butter around Tamale annually.

19. The principal importance of some species of economic tree is for soil and water conservation. Whitethorn, *Faidherbia albida*, is maintained in the fields as a soil improver and the borassus palm, *Borassus aethiopicum*, appears to function in the same manner⁹. In addition, it has been shown in Burkina Faso that shea has positive effects on sorghum production. When considering increasing output, the significant contribution of some species that do not produce economic products that are directly marketed must be considered.

1.5 Livestock

20. **The major livestock species** kept in northern Ghana include cattle, sheep, goats, horses, donkeys, pigs and poultry of various types. There are no intensive production systems in the region and small stock are allowed to forage freely in the dry season and confined in the wet. Animal traction was introduced into this region in the 1930s to increase production of cash crops, especially cotton. The main implement used is a heavy ridger pulled by paired oxen. Carting has never been at all common, but donkey-carts based on Burkinabe models are becoming widespread in drier areas. Prices for carts remains a major constraint for many farm households. Donkey ploughs are many ways more suitable for the light, sandy soils in the north of the region and donkeys are substantially cheaper both in purchase price and maintenance.

21. Livestock is being considered as an element in raising rural incomes and possible entry points are improved poultry production, especially guinea-fowl and turkeys. Urban demand for guinea-fowl is increasing and this species also has export potential if health issues can be resolved¹⁰. The Programme will encourage the purchase and improved feeding of cattle and donkeys for animal traction. Repair of traction implements has proved to be a constraint in UWADEP and LACOSREP and the Programme may consider bringing in experienced Malian blacksmiths to train local apprentices given the lack of local skilled blacksmiths. Although micro-credit is often proposed for small ruminants, it is unclear how this can address the value-chain orientation of the Programme and will be discussed at formulation.

1.6 Fisheries and aquaculture

22. Northern Ghana is shot through with rivers, notably the Red, Black and White Voltas. The potential for inland fisheries is very significant but is relatively underexploited compared with, for example, the intensive fisheries that operate on the Niger river. There are no specialised fishing-peoples and even canoes and fish-fences are not common on the large water-courses. Fishing appears to be a highly ritualised activity and the community will take part on large-scale communal fishing of a specific resource at a particular time of year. This low-key attitude is reflected in government, whose fisheries departments are sparse and concerned principally with the transport and supply of frozen and chilled fish from the Volta or even the sea. The small dams and dugouts that have been rehabilitated throughout the region provide an opportunity for stocking with fingerlings, principally tilapia and catfish, but this is only practised very unsystematically. Fisheries interventions indicate that very significant returns are possible from rearing of fish in dam areas, but promotion of independent uptake by communities has so far been insufficient as timing of interventions, number of

⁹ There is no agronomic proof of this, but stands of Borassus palm are conserved by farmers in fields, especially in the northeast of the region, suggesting they value its contribution to soil fertility.

¹⁰ Guinea-fowl do not respond well to intensive production methods and the yard systems in Northern Ghana produce a taste preferred by consumers.

visits, and level of training for beneficiaries varies from site to site and does not seem to follow any discernible pattern.

23. There is considerable enthusiasm for aquaculture among NGOs, donors and government officials and indeed positive experiences in Nigeria might make this seem a viable option. However, it is worth noting that aquaculture has only taken off in regions where intensive fisheries have massively depleted the 'wild' resource, for example in the Niger River. Aquaculture takes an investment of labour and capital and this will not be made while there a free resource that can be exploited. It is certainly the case that greater extraction of freshwater fish in the Volta system could be permitted without serious damage to the ecosystems and this is probably the first option.

2. Adding to the value chain

2.1 Processing

24. Small scale processing may be divided into traditional practices such as the extraction of shea-butter from the shea nuts and the production of *dawadawa* cakes from locust-tree seeds, and more modern practices, including the drying of tomatoes, okra and peppers to absorb un-marketed surpluses. The drying of mangoes, cashew nut extraction and the making of sesame paste and oil are not yet widespread and there are issues of quality control. However, products could probably be improved with a small amount of training. Agricultural product processing is almost entirely in the hands of women, and their access to capital limits their capacity. An inability to finance future contracts (for example the supply of shea nuts) means that they are unable to take advantage of strong seasonal fluctuations in prices.

25. Especially in the case of shea-nuts there is a strong economic advantage to be gained from local processing. Many buyers (notably the Chinese and Dutch) prefer unprocessed nuts because the end product they seek is shea-oil (refined from the butter). Other cosmetics buyers (such as the Body Shop) are willing to buy local shea-butter at preferential prices. However, world demand is such that speculative buyers appear in Tamale every dry season and if women's groups were better capitalised they would be able to take advantage of such spontaneous sales.

2.2 Marketing

26. Broadly speaking, agricultural exports from Northern Ghana have been limited until recently, with the great majority of production going for local markets and seriously depleted regions such as UER possibly net food importers. The gradual improvement in road infrastructure has created potentials for dry-season irrigated crops such as tomatoes and onions as well as rice, but volumes have been small and a combination of cartel price-fixing and quality control issues have kept profits down and done little to discourage large-scale migration of labour to the south. Even so, Ghana is a major importer of numerous agricultural products from countries further north, notably staples such as rice and groundnuts, but also horticultural crops such as onions and tomatoes which it has a demonstrable capacity to produce. The potential for import substitution is thus considerable. Within the three regions, significant differences in market access exist. Upper West and the western and eastern parts

of the Northern Region have bad road infrastructure. Farmers' organisations also have different levels of communication skills and links to urban areas through kinship and ethnic networks.

27. Markets for northern products can be divided into three categories, local, national and international. There is a potential subregional market such as Nigeria exploits, sending humid zone products further north, but this is of little significance for Ghana which is a net importer from the subregion. Since the mid-1990s, there have major shifts in markets for agricultural products which can be summarised as follows:

- (a) national (i.e. internal) diaspora communities (e.g. northern Ghanaians living in the south) are increasingly active both in consuming 'home' products and arranging for the trade in them;
- (b) external diaspora communities are becoming wealthier thereby strengthening demand for 'home' products;
- (c) some Asian economies have switched from being producers to consumers (e.g. China is now buying agricultural goods rather than selling them);
- (d) demand for organic and ethical products in western markets continues to increase, and is being extended to exotics such as mangoes and papaya;
- (e) improved communications (mobile phones) and better roads within Ghana permit better market information and shortening of the chain between producer and consumer as well as outflanking cartels;
- (f) peace and better road links have also increased volumes of subregional trade and in particular Ghana is benefiting from instability in Cote d'Ivoire;
- (g) 'New' crops or cultivars (e.g. watermelons/beer sorghums) are reaching the market.
- (h) increased demand for more predictable quality, conformation and size of foodstuffs by urban consumers

3. Adding value to Northern products

3.1 Quality control

28. The quality of many northern agricultural products is variable, a variability tolerated by local consumers but less by the urban markets in the south and much less by international buyers. For example, yams of almost any conformation can be sold locally, whereas well-shaped yams command a premium on the national market and international buyers will simply not accept oversized or distorted tubers. This seems highly counter-intuitive to local producers, for whom issues like pounding quality and storability are higher priorities. However, a type of rather haphazard training is taking place as Accra-based buyers seek to increase international market share in competition with well-established Brazilian producers by encouraging their producers to select more marketable yams. Clearly, more organised training and better information would significantly increase Northern growers' capacity to produce a higher percentage of exportable yams. Similar issues face many other crops, for example chilli peppers or okra. Fruits such as mango and papaya need to meet very high standards in terms of surface marking and bruising and to increase marketable share in this area implies considerable training.

3.2 Organics

29. As in most West African countries, the formal organic sector in Ghana is still relatively underdeveloped. About 19,000 hectares of land are under organic cultivation, or only 0.13 % of the total agricultural area in Ghana¹¹. However, the majority of rainfed output and much irrigated production in the North is *de facto* organic, reflecting the high cost of inputs. As a consequence, the whole region has the potential to develop a formal certified sector. This is already underway on an experimental basis with mangos and if this process matures then it could easily be extended to other crops. Since Ghana does not have any significant domestic market for organic produce, future development relies on organic trading links being established to export markets, particularly in Europe. Demand for organics in Europe is steadily increasing and is constantly being extended to a wider range of products, so some more specialised Northern crops such as chilis and okra could benefit from the added value of certified organic production.

3.3 Ethical trading

30. As with organics, demand in the developed world for ethical or fair-trade products is rapidly rising and constantly being extended to new areas of the consumption spectrum. Fair-trade cocoa and coffee are already exported from West Africa, but ethical certification could clearly go hand-in-hand with organic certification, bringing greater premiums to producers. The ethical market depends heavily on effective promulgation in the developed world and the willingness of NGOs to develop narratives that attract potential consumers. This in turn should be linked to §3.5, the promotion of ‘unfamiliar’ crops in these same markets, since the promotional pathways and outlets are much the same.

3.4 Effective targeting of northern consumers within Ghana

31. Millions of migrants make their way south every dry season and southern Ghana now has a significant permanent ‘northern’ population. As they become more established, as with the external diaspora, they are seeking more regular supplies of foodstuffs produced in their home area. At present, crops such as Bambara groundnut or roselle, which are popular in the north but little-known to southern consumers, are irregularly available at unpredictable prices. A system of making such foodstuffs available throughout the year at established sale points and the introduction of very basic quality control would improve the income of numerous farm households in the rainfed areas. This could be linked to the accelerated promotion of ‘unfamiliar’ crops in developed markets (§3.5). Suitable crops for targeting northern consumers are African rice, fonio, roselle, Bambara groundnuts, Kersting’s groundnut, melonseeds and Frafra potatoes.

3.5 Promotion of ‘unfamiliar’ crops in developed markets

32. Since the 1990s, there has been a considerable expansion of unfamiliar foodstuffs in the markets of the developed world, often beginning with health food outlets and then moving to supermarkets. This is most common with fruits and vegetables, but the promotion of highly local cereals and tubers

¹¹ IFOAM & FiBL 2006

such as quinoa and oka has also been successful. This requires both a reliable supply from producers and an appropriate partner in the developed world with a knowledge of the pathways for such introductions. Such promotions should link the organic status of these crops and their ethical production. Suitable crops would be African rice, tiger-nuts, Bambara groundnuts, Kersting's groundnut, melonseeds and fonio.

4. Increasing output

4.1 Improved soil and water conservation

33. Northern Ghana varies between subhumid and semi-arid in terms of climatic regime. The mean annual temperatures are ca. 25° and the annual rainfall some 1000-1500 mm in the Tamale area falling to 700-1200 mm in Upper East. The rain falls in a six-month season from April to September. Rainfall can be very patchily distributed and farmers often plant seeds two or three times before the rains set in reliably.

34. **Soil fertility** is determined as much by the exceptional concentrations of population allied with a low-input farming system as the geological base. Throughout most of UER, except in the extreme west, the system does not encourage the return of nutrients to the soil. Livestock roam freely in the dry season, but in the wet season they are taken away from the area to avoid damage to crops and the manure is effectively lost. Most trees, even leguminous ones, have been removed from the farms in order to increase cropping area. Firewood is so short that the stems of cereals are removed from the farms and used to cook food, thus not returning their organic matter. The elimination of almost all types of ground cover leaves the area prone to wind erosion. Within the lower density areas of NR and UWR, many of these problems have been avoided.

35. The potential for increases in rain-fed crop productivity in Northern Ghana is very high, as comparative evidence in Nigeria and Burkina Faso demonstrates. This is partly because, due to extensive dry-season labour migration, soil and water conservation is barely practised, with consequent low soil fertility. Typical techniques, such as organic matter incorporation, bunding, land levelling, more complex intercropping, adoption of cultivars from neighbouring countries, use of ploughing to raise ridges and thereby increase rooting systems and access to residual moisture can be effective in increasing yields. Soil and water management should be coupled with improved market access for rainfed crops. This strategy requires a significant initial sensitisation/extension effort to overcome producers' lack of interest and is likely to be successful to the extent that over time, income from rainfed crops will outweigh income from migration.

Table 3 shows the main water development options in Northern Ghana;

Table 3. Water development options in Northern Ghana

| Options | Status |
|---|---|
| Small scale dams | Extensively inserted by government, donor projects and NGOs throughout North. Generally successful, but cost is high and maintenance pathways (for larger repairs) not well established. Poor mitigation of health and environmental impacts. |
| Dugouts | Extensively inserted by government, donor projects and NGOs throughout North. Generally successful, but poor mitigation of health and environmental impacts. Rises in numbers of migrant cattle could make these sites sources of friction |
| Culverts/bridges for water retention as add-on for feeder roads | This technology works well with high maintenance and extensive supervision (as in the AFD project). However, post-project community maintenance is extremely poor and this technology will not work unless much greater training investments are made. |
| Pumping from rivers | This is being tried informally on some river systems in Northern Ghana and undoubtedly produces the best return (in terms of land cultivated per \$) of any of these technologies. Although collective pumps theoretically have economic advantages, in practice households prefer small individual pumps because a) they control refuelling and maintenance b) they can easily moved by bicycle. One of the objections to pumps is that they introduce inequity, but experience from other West African countries suggests that individuals will cycle long distances in order to make use of their productive advantages. |
| Natural flood-plain irrigation | This technology is not established anywhere in Ghana, although it works well in some neighbouring countries (Mali, Nigeria) and has potential along the White Volta. Advantages are that it makes maximum use of natural fish production and is environmentally beneficial (limited standing water and river-bank protection). Disadvantage is that it requires significant initial investment in earthworks, community training and co-operation (does not work for an individual household). |
| Wind pumps | Just two wind-pumps have been installed on an experimental basis in Northern Ghana and it appears that neither pump is being properly maintained, nor are the gardens being irrigated to maximum efficiency. Should be treated with caution until proven to work. |
| Drip technology | Although potential is great on existing dams, drip irrigation is only now being implanted on an experimental basis by ICRISAT. Given the high maintenance and the short training time envisaged by ICRISAT, the viability of this technology is doubtful at best. |

62. **Agroforestry** is particularly suited to the region and can help introduce permanent cropping alongside annual cropping, thereby improving both production and income levels. Indeed, in high-density regions of UER and NR, it may be the only solution to maintaining soil fertility where fertiliser prices are prohibitive to poor farmers. Indigenous agroforestry systems in UWR based on the cultivation of yams and vegetables below certain trees, such as locust (*Parkia biglobosa*), neem (*Azadirachata indica*) and acacia (*Acacia albida*) are a local response to soil fertility constraints and are worth investigating for wider application¹².

¹² Frustratingly, researchers at SARI deny the existence of these systems, despite their importance in the east of UWR.

4.2 Research

36. Previous IFAD Programmes directly funded a research component through SARI which was intended to feed into agricultural productivity increases. However, the evaluations of existing programmes showed that the research was very costly and unresponsive to the needs of programme beneficiaries. Even MoFA departments are increasingly looking to other providers, especially those in the subregion such as Burkina Faso, where research-extension linkages are markedly more effective than in Ghana. CGIAR agencies such as ICRISAT, WARDA and IITA should also be approached for technical advice and perhaps for focused consultancy. Most important, probably are familiarisation visits to neighbouring countries such as Burkina Faso and Niger to better understand the station-extension-farm transmission process, either to replicate parts of this in Ghana or to commission the relevant agencies to work in Ghana. Research will be commissioned for individual commodities from competitive providers rather than being assigned to monopoly research organisations and will be targeted towards answering specific needs raised by the Programme implementation.

4.3 Agricultural extension

37. The existing agricultural extension system has a somewhat limited record of success in the Northern regions. The reasons for this can be summarised as follows;

- a) Inappropriate research has meant that the advice officers have to give is often irrelevant to farmers' needs
- b) The top-down attitude of extension officers and thus their ignorance of actual farmers' practice leads to farmers dismissing their advice
- c) Innovation by farmers is not incorporated into change in extension messages
- d) Inadequate transport and other communications facilities has meant that even if their advice were appropriate, delivering it would be very difficult
- e) Failure to adapt to technology can make existing delivery mechanisms inappropriate (in an era when farmers have adopted mobile phone technology extension services have not responded accordingly)

It is difficult to see how the existing MoFA system can be revitalised as its structural inertia is too great. No amount of training or refurbishment, those great stand-bys of donor projects, will have any significant impact.

38. The record of NGOs is considerably better, especially in the area of agroforestry, water and sanitation and animal traction. However, it is far from perfect in the area of crops and commodities, in part due to a lack of research and in part because NGOs are donor-driven and are more likely to get funding for 'sensitising' populations than for delivering technical inputs. There is, however, evidence that extension systems in neighbouring countries (which are usually a blend of government and NGOs) are much more effective in rural areas.

39. NRGF will thus need to try and develop a 'market' for a range of service providers. This is frankly experimental, as there is no great pool of expertise on the ground. This will require an intensive learning process based on experience in neighbouring countries and co-operation between government and the private sector. NGOs will also require a major re-orientation towards a commodity chain approach, both developing an understanding of the market and re-acquainting themselves with technical issues which have had a low profile in recent years.

5. Health and environmental issues

5.1 Health

40. **Health issues** have been poorly managed within development projects in Northern Ghana. Dams, dugouts and other types of irrigated agriculture have health implications, notably increased schistosomiasis and malaria. Dams also contain significant amounts of biological contamination, such as coliforms, which are associated with an absence of sanitation. Some wells have high levels of arsenic. Any expansion of water delivery should not be contemplated without both devising a programme for identifying and treating those already affected by helminths and developing a system of monitoring that will prevent or manage infestation in future. NGOs such as ADRA have a much better record of working with communities on these issues as MoFA is required to allocate scarce funds to MOH for this purpose. NRGF should write in MOH funding as mandatory.

5.2 Environmental management

41. All expansions of water delivery have environmental consequences, some of them considerable. Failure to protect catchments of dams can accelerate erosion in fragile areas. If riverside pump-based gardening takes off, it will lead to the clearing of gallery forest along rivers, with potential erosion of river-banks, flooding, widening of the channel, increased health risks etc. All of these can be avoided by a coherent program of river-bank stabilization. Ghana has an appropriate legal framework for the registering and survey of infrastructure projects for environmental sensitivity, but enforcement capacity is limited, and even other government departments regularly over-ride their recommendations. Further investment in Northern Ghana should pay much greater attention to the monitoring of environmental issues and enforcement of mitigation, through a greater integration of environmental parameters in project design.

6. Making coherent farmers' and other organisations

42. Ghana typically has strong producers' organisations (e.g. tomato growers), especially in the south. Farmers' Organisations (FOs) in the north are less structured and in a number of cases are established principally to access donor credit and may fall apart at the end of Programmes. However, less formal self-help groups do function and can often mobilise labour and cash through kinship networks. Collective farmwork organisations, structured through a circulating labour pool are a long-established tradition and can be put to new purposes (for example road maintenance). However, interviews suggested that there is a lack of enthusiasm for collectively owned irrigation pumps, presumably because of the difficulties of entrusting maintenance to other individuals. Once farmers had made enough profit to buy their own, smaller pump, they preferred this to group membership, with the uncertainties it entails. However, Functional Literacy Groups (FLGs) established under LACOSREP II were not accessing credit through the project but still were able to make use of their corporate identity to get loans from local religious NGOs.

43. The conclusion to be drawn is that farmers are highly sensitive in developing exactly the degree of co-operation they need in respect of particular tasks. As a consequence, the standard NGO/donor

model of an FO is likely to be of limited application. But kinship and ethnic networks seem to work exceedingly well, as the recent development of improved marketing chains through the use of mobile phones demonstrates. Understanding such networks and learning to assist them in a less formal manner than is usual in this type of project is more likely to be successful.

44. In the case of traders' networks, more formal assistance from the proposed NRGF may be indicated. Traders thrive on information and a project should be in a good position to access information that would be costly and prolonged for an individual trader. Typical information that could be made available would be;

- a) organic and ethical certification processes
- b) status and prices of Northern Ghanaian products
- c) potential processing innovations to add value to existing products
- d) improved packaging and storage techniques
- e) promotion of minor, new and unusual crops and cultivars

In due course this could be made available through a trade association which should become self-funded over time.

7. Targeting beneficiaries

45. NRGF faces a significant structural problem in designing a project to assist the rural poor. Area development projects are increasingly unfashionable as donors switch to budget support or sector-wide approaches. However, poverty in Ghana has a marked geographic focus, as the three northern regions have some of the worst rates of malnutrition, child mortality and school attendance in the country. Chronic labour migration and a consequent lack of investment in rural production has made it difficult to break the cycle of rural poverty and budget support in particular has decreased flows to the rural north. It is therefore essential that a geographic focus is maintained to continue assistance to Ghana's most deprived regions.

46. **Diagnosis.** Within the three northern regions there is considerable variation in ecology, society and economy which is reflected in both the incidence of poverty and the degree of integration in the market economy. Any project, and NRGF in particular, must perform its own detailed analysis of the situation if it is to develop solutions that are sensitive to particular issues. For example, households with access to fertile land in higher rainfall areas (as in UWR) can consider a wide range of crops with a low level of inputs. These crops, however, must not be perishable as the poor road to external markets makes spoilage *en route* a distinct possibility. Households with access to riverine land can make use of interventions designed to develop dry season agriculture. This may seem evident but the typical 'one-size fits all' activities in previous projects have not always recognised the importance of the diagnostic process. In part this is because research has not been integrated with the projects but was either not commissioned or was handed to government agencies with little experience in this area. As with extension, diagnosis must be put out to the private sector, particularly the NGOs, which often have more grassroots knowledge. Even so, it needs to be recognised that capacity is limited in this area.

47. **National context.** Area development projects typically focus their activities almost entirely within the project area. However, analysis has suggested that Northern Ghana is a weakly integrated region, and part of the key to increasing household incomes is improving regional links to the broader

economy, in particular by focusing on the whole commodity chain, from the farm in Upper East to the dockside at Tema. This implies dealing with all aspects of the chain, including traders, wholesalers, information providers and others who may themselves not be poor but who constitute an essential series of links leading back to the farm household. It should be recognised that this is an approach atypical of previous project structures (and furthermore may not be suited to the oversight of a single ministry).

48. **Gender issues.** Labour migration is more common among men than women and more women remain behind, managing old people and children while farming unsustainable farms and depending on food aid and remittances (or even direct shipments of food) from their menfolk. However, male migration by no means always the case, as men and women migrate equally in some areas, while in the yam-growing areas where men are employed through the dry season, women migrate preferentially. The consequence is a high incidence of households that are effective female-headed, with consequences for particular interventions. For example, women find donkeys easier to buy and manage for traction and carting, and indeed requested them under UWADEP, which however, only supplied oxen. Women grow particular crops (groundnuts, Bambara nuts, melonseeds, Frafra potato) and request assistance with these, only to find research is focused on maize. Designing interventions that respond to these needs is not difficult but it does require the diagnostic process to function effectively.

49. **Access issues.** Of particular concern is the inequity created by variations in access to resources, notably water and fertile land. Such differences have already been responsible for uneven development with both donor projects and NGOs homing in on communities within easy reach. A strong focus on rainfed crops is one means of rectifying this imbalance but it is also essential to map communities (perhaps using GIS systems) and then simply ensure they are reached by NRGP as part of its mandate.

50. **Market zonation.** Access to roads and markets varies substantially throughout the region. Accessible communities are also often able to better lobby the regional government thus exacerbating unequal infrastructure provision. For households close to roads many interventions are possible, because the relative costs of improving the market chain are low compared with those remote from communications arteries. UER, for example, due to its shape and the existence of a main road to Burkina Faso as well as to Togo, has good access throughout. UWR has very poor access due to the lack of an all-weather road to Wa, as does eastern NR. As a consequence, the relative profitability and risk attached to growing perishable garden products varies significantly. The fact that UWR farmers are placing greater emphasis on staple crops, such as yams, garlic and onions, suggests that they are more aware than project management of these factors. Project design should thus integrate strategies that take realistic account of access considerations.

51. **Social protection issues.** Certain groups, such as the blind, single mothers, the physically disabled and the very old cannot be reached by conventional interventions. Migration and household fragmentation is likely to exacerbate this situation. Experience at Karne dam site in UWR shows that the socially excluded can benefit with additional management inputs; and NGOs are well placed to deliver these. IFAD's mandate and broader ethical considerations should make it mandatory for these groups to be integrated into NRGP.

52. **Timeliness.** The delivery of interventions in previous projects was in many cases not very timely. This can often lead to a wastage of human resources, for example, when people are trained to form a WUA for a dam that is never completed. It can have even more deleterious effects in micro-finance.

In an economy with high inflation, capital in banks is wasted if not put to use. If a bank takes a year to decide about a relatively small loan, the 'beneficiaries' actually lose money, as they could have invested their capital in something more productive.

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Roselle

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Yams

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Appendix: Northern Ghana Regional Growth Project

Roger Blench

Crops, livestock breeds and their potential in the region

| Name | Ghanaian Name | Latin Name | Wom en's crop | Irrig-ated? | Rain-fed | Comment |
|----------------|------------------------|-----------------------------|---------------|-------------|----------|---|
| Cereals | | | | | | |
| Sorghum | Guinea corn | <i>Sorghum bicolor</i> | | – | + | Beer varieties, i.e. 'dorado', in high demand. Red sorghums used for beer. |
| Millet | Millet | <i>Pennisetum glaucum</i> | | – | + | Very low productivity and potential for greater output unknown. Recent expansion of demand for <i>koko</i> (gruel) varieties has led to experimental introduction of Burkina Faso cultivars |
| Maize | Maize | <i>Zea mays</i> | | + | + | Uncertain government import policies plus high input requirements make this a difficult crop to support although it is an important source of cash in peri-urban areas. Irrigated maize for sale as fresh cobs has a limited sale in dry areas. |
| Rice | Rice | <i>Oryza sativa</i> | | + | + | Prime candidate for import substitution. At present, limited cleaning facilities and high transport costs make this uncompetitive. Large-scale irrigated rice unproductive. Natural flood-plain irrigation and synergies with fish production under-exploited |
| African rice | African rice, red rice | <i>Oryza glaberrima</i> | | + | + | Only locally distinguished clearly from Asian rice. Good potential as a branded export crop to niche markets. De facto organic. |
| Fonio | Fonio | <i>Digitaria exilis</i> | | – | + | Only locally important in NE. Good potential as a branded export crop to niche markets. |
| Tubers | | | | | | |
| Yam | Yam | <i>Dioscorea guineensis</i> | | – | + | Prominent in southern NR and UWR. Already exported on a small scale and could be expanded. |

| Name | Ghanaian Name | Latin Name | Women's crop | Irrigated? | Rain-fed | Comment |
|----------------------|-----------------------------|--------------------------------|--------------|------------|----------|---|
| Cocoyam | Cocoyam | <i>Colocasia esculenta</i> | | + | + | Probably not competitive with production in higher rainfall zones |
| Livingstone potato | Frafra potato | <i>Plectranthus esculentus</i> | + | - | + | Good potential as a branded export crop to niche markets. Little researched and potential for greater output unknown. |
| Sweet potato | Sweet potato | <i>Ipomoea batatas</i> | | + | - | Demonstrated potential for increased local output. Processing innovations being tested in UER but even traditional methods can store well. Exported to Burkina Faso. |
| Cassava | Cassava | <i>Manihot esculenta</i> | | - | + | Demonstrated potential for increased local output. RTIMP focus so no need for action from this project |
| Aerial yam | Air potato | <i>Dioscorea bulbifera</i> | | - | + | Little researched and potential for greater output unknown. Seasonal snack food especially in UWR. |
| Tiger-nuts | Tiger-nuts | <i>Cyperus esculentus</i> | + | - | + | Little researched and potential for greater output unknown. |
| Pulses | | | | | | |
| Cowpea | Beans | <i>Vigna unguiculata</i> | + | - | + | Extensively imported because Ghana cowpeas poorly processed and slow-cooking varieties. Good potential for import substitution. Available technologies may reduce weevil infestation. |
| Bambara nut | Bambara bean/ Roundbeans | <i>Vigna subterranea</i> | + | - | + | Little researched and potential for greater output unknown. |
| Kersting's groundnut | ? | <i>Kerstingiella geocarpa</i> | + | - | + | Little researched and potential for greater output unknown. |
| Groundnuts | Groundnuts | <i>Arachis hypogaea</i> | | - | + | Widely imported for processing. Good potential for great production of snack varieties |
| Soy-beans | Soy-beans | <i>Glycine max</i> | | - | + | In great demand for processing and production increasing every year. Good |

| Name | Ghanaian Name | Latin Name | Women's crop | Irrigated? | Rain-fed | Comment |
|-------------------|---------------|--------------------------------|--------------|------------|----------|---|
| Pigeon-peas | Pigeon-peas | <i>Cajanus cajan</i> | + | - | + | potential for greater output. Fermented cakes made from seeds sold locally in UER. Little researched and potential for greater output unknown. |
| Vegetables | | | | | | |
| Tomato | Tomato | <i>Lycopersicon esculentus</i> | | + | - | Strong pressure on prices from collusion by market queens and extensive importation from Sahel. Probably not a suitable focus for this project. Varieties with extended storage should be investigated. |
| Onion | Onion | <i>Allium cepa</i> | | + | - | Widely grown in UER but Ghana imports most of its needs from the Sahel. Good potential for import substitution. |
| Garlic | Garlic | <i>Allium sativum</i> | | + | | Demand and supply unresearched. Good potential for import substitution. |
| Eggplant | Garden egg | <i>Solanum incanum</i> | + | + | + | Widely grown but demand and supply unresearched. Numerous local cultivars not entering international trade. |
| Okra | Okra | <i>Abelmoschus esculentus</i> | | + | + | Widely grown but demand and supply unresearched. Numerous local cultivars not entering international trade. |
| Sorrel | Sour-sour | <i>Hibiscus sabdariffa</i> | | - | + | Widely grown but demand and supply unresearched. |
| Kenaf | Kenaf | <i>Hibiscus cannabinus</i> | | - | + | Widely grown but demand and supply unresearched. |
| Sesame | Beniseed | <i>Sesamum indicum</i> | | - | + | Strong international demand but declining local supply. Harvesting may be a constraint. |
| Chili | Pepper | <i>Capsicum annum</i> | | + | + | Widely grown but demand and supply unresearched. |
| Chili | Pepper | <i>Capsicum frutescens</i> | | + | + | Widely grown but demand and supply unresearched. Numerous local cultivars not entering international trade. |
| Waterleaf | Alehu | <i>Amanthus spp.</i> | + | + | + | Widely grown but demand and supply unresearched. |

| Name | Ghanaian Name | Latin Name | Women's crop | Irrigated? | Rain-fed | Comment |
|------------------|-------------------------|---------------------------------|--------------|------------|----------|--|
| Bitterleaf | Bitterleaf | <i>Vernonia maygdalina</i> | + | + | + | Widely grown but demand and supply unresearched. |
| Cats' whiskers | | <i>Gynandropsis pentaphylla</i> | + | ? | + | Widely grown but demand and supply unresearched. |
| Ginger | Ginger | <i>Zingiber officinalis</i> | | + | + | Demand and supply unresearched. Good potential for greater output. |
| Cucurbits | | | | | | |
| Pumpkin | Pumpkin (round, orange) | <i>Cucurbita maxima</i> | | - | + | Widely grown but demand and supply unresearched. |
| Pumpkin | Pumpkin (oval, green) | <i>Cucurbita pepo</i> | | - | + | Widely grown but demand and supply unresearched. |
| Watermelon | Watermelon | <i>Citrullus lanatus</i> | | + | + | Widely grown but demand and supply unresearched. Cultivars recently imported from Burkina Faso preferred by southern consumers. Effective producer-market links. |
| Egusi melon | Agushi, nere | <i>Citrullus lanatus</i> | + | - | + | Good potential for greater output. |
| Fruits | | | | | | |
| Lemon | Lemon | <i>Citrus limon</i> | | - | | Imported into North and requires irrigation. |
| Orange | Orange | <i>Citrus sinensis</i> | | - | | Imported into North and requires irrigation. |
| Mango | Mango | <i>Mangifera indica</i> | | + | + | Local varieties grown and consumed widely in the north but export quality may not be viable. Premium for certified organic mangoes. |
| Papaya | Papaya | <i>Carica papaya</i> | | - | + | Local varieties grown and consumed widely in the north but export quality may not be viable |
| Banana | Banana | <i>Musa paradisiaca</i> | | + | + | Imported into North and requires irrigation. |
| Cashew | Cashew | <i>Anacardium occidentale</i> | | - | + | Possibly competitive in the North and potential currently under investigation |
| Guava | Guava | <i>Psidium guajava</i> | | - | + | Possibly competitive in the North but potential currently unknown |
| Oil-palm | Pam-nut | <i>Elaeis guineensis</i> | | | + | Fresh palm nuts presently imported from further south |

| Name | Ghanaian Name | Latin Name | Women's crop | Irrigated? | Rain-fed | Comment |
|-----------------|---------------|------------------------------|--------------|------------|----------|---|
| | | | | | | for soup, but could be supplied from UWR. |
| Others | | | | | | |
| Cotton | Cotton | <i>Gossypium hirsutum</i> | | - | + | Formerly widely grown but unlikely to be viable. |
| Tobacco | Tobacco | <i>Nicotiana tabacum</i> | | - | + | Not encouraged for ethical reasons |
| Sugar-cane | Sugar-cane | <i>Saccharum officinarum</i> | | + | - | Imported into North and requires irrigation. |
| Loofah | Loofah | <i>Luffa cylindrica</i> | | - | + | Possibly competitive in the North but potential currently unknown |
| Castor | Castor | <i>Ricinus communis</i> | | - | + | Possibly competitive in the North but potential currently unknown |
| Chewsticks | | <i>various</i> | | - | + | Possibly competitive in the North but potential currently unknown |
| Spices | | <i>various</i> | + | - | + | Possibly competitive in the North but potential currently unknown |
| Herbal remedies | | <i>various</i> | + | - | + | Possibly competitive in the North but potential currently unknown |

Protected tree species

| English Name | Ghanaian Name | Latin Name | Comments |
|--------------|---------------|----------------------------|---|
| Locust | dawadawa | <i>Parkia biglobosa</i> | Fermented cakes made from seeds possibly much greater potential if smell removed |
| Shea | Shea | <i>Vitellaria paradoxa</i> | Prices for raw nuts very high and local shea-butter already sold to L'Oréal for a premium price. Apparently a market for oil; technological limitations to be researched. Access limits amount harvested from wild trees. Cultivars with short maturity times from Burkina Faso now being tested. |
| Tamarind | Tamarind | <i>Tamarindus indica</i> | Possible extended market for dried fruits and chewsticks |
| Baobab | Baobab | <i>Adansonia digitata</i> | Possible extended market for dried leaf-powder and dried fruit-pulp used in soups. Fermented crushed seeds used as a spice in UWR |
| Jujube | ? | <i>Ziziphus mauritiana</i> | Fresh and dried fruits have local market in UER and possible international export market. |
| Ackee apple | Ackee apple | <i>Blighia sapida</i> | Possible extended market for raw fruits |
| Black plum | Black berry | <i>Vitex doniana</i> | Possible extended market for raw fruits |

Other bush products

| English Name | Latin Name | Comments |
|--------------|-----------------------|---|
| Lotus root | <i>Nymphaea lotus</i> | Fresh and dried roots sold on markets. Not developed in West Africa but a highly marketable product in SE Asia. |
| Rubber vine | <i>Saba florida</i> | Fruit sold in markets, rubber used as household product |

Livestock

| Name | Comments |
|--------------|--|
| Cattle | Meat animals imported from Burkina Faso and unlikely to have a competitive advantage. Bullocks for animal traction need to be developed through improved feeding programmes |
| Donkey | Donkeys are highly suitable for traction and carting in Northern regions, need less feeding than oxen and are cheaper, which makes them attractive to women-headed households. |
| Sheep, goats | Expanded market for northern breeds esp. cross-breeds. Livestock projects have a problematic record in the region. |
| Guinea-fowl | Guinea fowl reproduce well with local conditions. Keet mortality is high and this could be reduced with appropriate housing. Possible southern and international market for dressed fowl as farmed varieties are rather tasteless. |
| Turkey | Household turkey production increasing in northern parts of the region. Potential to increase local production. |