

INTENSIVE LIVESTOCK PRODUCTION: LESSONS LEARNED AND FUTURE PROSPECTS¹

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ABSTRACT

The focus of this paper is the commercial production of poultry and pigs permanently confined in some kind of housing. Data on livestock numbers and production indicate low levels of commercial pig meat production compared to that from traditional systems. The opposite holds true for poultry products. There is significant production of broiler chickens by independent growers, mainly sold in the live bird markets. The demand for meat and eggs is expected to continue to grow at about five percent per year due to population increases and factors to do with urbanization, incomes and aspirations. Papua New Guinea conditions are favourable for intensive production, especially by smallholders. There are minimum sizes of operation for practicality but the economics of scale are not important. Local production of feeds is feasible making good use of local resources but quality feeds will never be cheap. The concepts of nucleus estates and vertical integration are appealing but implementation is problematic. A number of lessons from past experiences with intensive systems give guidelines for best practice. It is concluded that the bulk of desired growth in livestock production over the next 10-20 years can come from smallholders and this will be profitable for them.

Keywords: *Broiler chickens, egg production, pig production, meat demand, smallholders, integration, best practice*

INTRODUCTION

Intensive animal production can be regarded as any system of keeping animals under close confinement. There is a range of systems from cattle in feedlots to chickens or rabbits in cages. Even the grazing of animals confined at high stocking rates on pasture as practiced for example in the New Zealand dairy industry can be regarded as intensive, as distinct from free range grazing systems. For the purpose of this discussion, interest is in the commercial production of animals permanently confined in some kind of housing and will be restricted to the production of broiler chickens, eggs and pig meat.

PRODUCTION AND DEMAND

In 2002 an attempt was made to summarise information and estimates on livestock numbers and production in Papua New Guinea (PNG) and the findings were published (Quartermain 2002). These estimates are reproduced in Table 1. The reasoning behind the estimates is clearly set out in the NARI Nius article and need not be repeated here.

What is important to note is the low level of commercial pig meat production compared to production from traditional pig keeping, although the latter is often very intensive. This is in contrast to the situation with poultry meat and eggs with traditional production estimated as being very low. What needs to be noted here is the very significant production of commercial broilers for the live bird trade by farmers not fully integrated into the large scale commercial sector. These numbers are not expected to have changed significantly over the last eight years.

However, it is expected that the demand for meat in PNG will grow at the rate of about five percent per year (Quartermain 2001). This is due to population increase at around 2.5 percent and a number of factors associated with urbanization, availability of cash and the search for improved diets. If such increase is to happen, much of it must come from intensive, commercial production. This is a world wide phenomenon. Consumption of meat in developing countries increased about five fold from the early 1970s to the mid 1990s. This is part of what has been termed the "Livestock Revolution". This is ongoing since consumption levels in the developing

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Table 1. Livestock numbers and production

Species	Component	Number	Production
Pigs	Village	1.8 million	27, 000 t
	Commercial	23, 500	1, 000 t
Cattle	Large-scale ranch	63, 000	2, 300 t
	Smallholder	17, 000	600 t
Sheep	Smallholder	15, 000	54 t
Goats	Smallholder	20, 000	72 t
Swamp buffalo	80 percent feral	4, 000	
Chickens	Commercial broilers		17, 500 t frozen
	Broilers live sales		6, 000 t carcass
	Commercial layers	200, 000 hens	54 million eggs
	Village	1.5 million	1, 858 t carcass
			6 million eggs
Muscovy ducks	Household	10, 000	
Rabbits	Household	15, 000	112 t

countries are nowhere near those in developed countries and populations continue to increase. Population growth, income growth and urbanization are driving these changes. The demand for livestock products is expected to double again in the next 20 years. Projections for the three main meat products are 3.9, 2.9 and 2.4 percent per year for poultry, beef and pork (Delgado et al. 2003). We might expect demand in PNG to exceed these figures because the country is lagging behind many other larger developing countries in income growth and the population continues to grow at a very high rate.

SYSTEMS AND SCALE OF PRODUCTION

Conditions in PNG are extremely favourable for the intensive production of meat and eggs to meet these projected increases in demand. PNG has an abundance of natural resources, either in the shape of crop residues and surpluses or of land, to support animal production as well as an enviable low disease risk status. There is currently relatively good support for research but there is a need to ensure on-going strength in the National Agriculture Quarantine and Inspection Authority for effective disease monitoring and border surveillance. In addition, many studies have shown that as long as smallholders value their own labour less than market wage rates, small family farms are typically more efficient at generating profits per unit of output than are large production operations, even with poultry production which is usually considered to have large "economies of scale". Smallholders therefore can and do compete, especially in PNG where there are serious management problems with large-

scale operations. However, there are minimal sizes of operation to be viable in commercial markets rather than simply for household or local village uses, and these need to be defined. Some forms of vertical cooperation (rather than vertical integration) are necessary to ensure input supplies, and access to credit, technical information and secure markets will not always be problems for smallholders. Smallholder production must be supported by policies and strategies to ensure such access.

For broilers, the minimal size of operation is generally dictated by the fact that day-old chickens are sold in boxes of 50. Similarly, a smallholder layer operation might have a minimal size of 150 birds in lay in order to have 50 replacement growers coming through at any one time. For pigs, a minimal size might be 12 sows and one boar for efficient use of the latter, unless he can be shared which is generally not a good idea. Simple farm budgets calculated using a range of assumptions suggest that if the ratio of the sale price of one kilogram of pork carcass, dressed chicken or eggs to the average cost price of one kilogram of purchased feed is in the range of 6-10 then profitability is assured, provided reasonable production targets are met and nothing goes drastically wrong. Such ratios are favourable for smallholders in PNG unless they are too isolated to purchase prepared feed. Local ingredient feed options are being developed for such situations and for those willing to do the extra work involved. What is important to understand here is that there is no such thing as "cheap feed". Feeds adequate to achieve acceptable levels of productivity and profitability can be produced in PNG using mainly PNG materials and at a lower cost

than imported feed. But they are not and cannot be cheap. Farmers cannot manage their units badly, fail to achieve acceptable productivity, and then blame their lack of profit on the cost of feed.

The concepts of "nucleus estates" and "vertical integration" are clearly appealing to planners, politicians and corporate business. Capital investment can be attracted by an integrated package and hence avoid the problems associated with providing credit to independent small-scale operators. There have been attempts in the past to group pig fattening units around a nucleus breeding unit but these have failed due to the kinds of management problems discussed later in this paper as well as problems with financial management and inability to realize unrealistic expectations with respect to output and profitability. One idea worth considering is to have a group of contract farmers breeding pigs and producing weaners, which would then be purchased at adequate and acceptable prices for finishing in a nucleus fattening unit. If the nucleus were also supported by its own breeding unit, such an arrangement would have substantially lower risk for investors.

The only really successful integrated business using the nucleus estate concept is Niugini Tablebirds. Ilimo Farms had a similar structure but failed for a variety of reasons which had little to do with the ability of contract farmers to grow chickens. Tablebirds has been successful because of strict central management, adequate financing, excellent training and support for staff and the contract growers, adequate but manageable sizes of grower operations and realistic expectations of profits to be earned by participants. The keys to success in any livestock production business are forward planning and realistic expectations of feed supplies at pre-arranged prices, farmer training and extension support, negotiated profit margins and, of course, care and attention to the needs of all animals. However, in considering this type of investment it should be born in mind that the impact will be localized and limited to a relatively small number of participants. Nevertheless there will be employment opportunities and stimulation of the local economy.

LESSONS FROM THE PAST

A number of lessons can be learnt from past and on-going failures of farmers to meet acceptable production targets. These can be itemized as follows giving guidelines for "best practice". They apply across species and production systems.

- It is essential to identify and assess the sustainability of markets and feed supplies before starting anything else. Forward planning is necessary even for a simple batch-in batch-out broiler operation but is absolutely essential for the longer term pig breeding or layer chicken enterprises.
- Given the uncertainties of sales on the live animal market it is necessary to develop flexibility to allow for feeding animals cheaply at maintenance levels after they have reached market weight. It may not be possible to sell 50 live broilers in one day or pigs may be held to get a higher price. However, common sense dictates that finished animals cannot be held too long before sale. Forward planning may allow for the targeting of known periods of increased demand such as Christmas.
- If, inadvertently, feed is short for reasons beyond the farmer's control, short term measures should include the targeting of animals most at risk such as brooding chickens, young pigs prior to and post weaning, and breeding sows. Other animals can be put "on hold" for short periods without disaster.
- The importance of good feed storage and handling cannot be stressed enough. This is an area of operation which is often overlooked and can lead to total failure. Food must be kept dry and cool, preferably stacked off the floor and away from a wall, and protected from rats. The supply must be regularly cycled so that the oldest feed is always that being used. No feed should be kept for longer than two weeks. Also, during the actual feeding operation, do not waste feed by using inappropriate containers or feeding too much at once. With pigs it is necessary to ensure that each animal gets its share of the feed at each feeding.
- The continuous supply of water and access to drinking water by all animals at all times is another essential husbandry necessity. In the PNG climate, laying birds in particular will immediately cease production if deprived of water for even one day.
- Emphasis in the provision of information and training needs to cover all of the points raised here, but there is a clear

need to concentrate on care and survival of the young, including especially the brooding of chicks and the husbandry of piglets during the first three weeks of life and during weaning.

- A major problem encountered with pigs is the demand made by buyers or others for the sale or gifting of breeding stock. Breeders need to avoid the unwanted sale or disposal of gilts or young boars selected for breeding and of breeding sows or boars in good condition. One solution is to divide the piggery into two sections, one open to the public with animals for sale and one closed for breeding stock.
- While the maintenance of cleanliness or hygiene is important in all livestock operations, it is of particular importance in intensive production units. We are not only concerned about animal health and pleasant working conditions, but also about waste disposal. Requirements concerning the avoidance of environmental pollution are only going to get more restrictive with public awareness and regulation. It is no longer simply a matter of washing effluent into the nearest river or gully. Of course, solid wastes such as chicken litter are used, can be used and should be used as fertilizer but there are implications for handling and labour. Disposal of liquid wastes is more problematic. There are solutions but these have capital and operational costs. The important point is that provisions must be considered and built into the planning and setting up of intensive units and not left until real problems emerge.

CONCLUSIONS

In conclusion it can be stated with some confidence that the demand for meat and eggs will continue to grow rapidly over the next 10-20 years or until such time as population growth slows down and PNG becomes a developed country. A high proportion of this demand will need to be met by intensive production from chickens and pigs. The bulk of this production can be met by smallholders and will be profitable for them, thus maximizing and spreading benefits throughout the community. Naturally there will need to be concurrent development of feed milling facilities, hatcheries and abattoirs, but these too can be small-scale and strategically located. There will always be room for larger scale, verti-

cally integrated enterprises and nucleus estate type arrangements but their impact will more than likely be restricted to servicing the needs of the larger urban complexes.

REFERENCES

- DELGADO, C., ROSEGRANT, M. AND WADA, N.** (2003). Meating and milking global demand: stakes for small-scale farmers in developing countries. In: *The Livestock Revolution: a Pathway from Poverty*. Brown A.G. (Ed.). Record of a Conference conducted by the ATSE Crawford Fund, Parliament House, Canberra – 13 August 2003, pp 13-23.
- QUARTERMAIN, A.R.** (2001). Potential for producing more meat from small-scale livestock production. In: *Food Security for Papua New Guinea*. Bourke, R.M., Allen, M.G. and Salisbury J.G. (Eds) 2001. Proceedings of the Papua New Guinea Food and Nutrition 2000 Conference, PNG University of Technology, Lae, 26 – 30 June 2000. ACIAR Proceedings No. 99: 625-629.
- QUARTERMAIN, A.R.** (2002). Livestock Numbers and Production in Papua New Guinea. *NARI Nius* 5 (1): 9. Papua New Guinea National Agricultural Research Institute, Lae.