Profitability and Sustainability of the Emerging Poultry Business in Developing Countries: A Case of a Poultry Grower of Nepal

Bhatta, Kiran Prasad and Ishida, Akira and Taniguchi, Kenji and Sharma, Raksha

1 August 2008

Profitability and Sustainability of the Emerging Poultry Business in Developing Countries: A Case of a Poultry Grower of Nepal

Kiran Prasad BHATTA*, Akira ISHIDA**, Kenji TANIGUCHI, Raksha SHARMA

1. Introduction

Commercial poultry farming[1)] is assumed to be flourishing nowadays. Recent data from several organizations showed that large-scale commercial poultry farming is increasingly becoming popular even in the developing countries like Nepal (CBS, 2004; CBS, 2008; FAO, 2008). For instance, in Nepal increase in poultry production for the five year period from 1991 to 1996 was found only to be around 6%, although for the similar five year period between 1996 to 2001 it was more than 36% (FAO, 2008). Data collected by the Central Bureau of Statistic of Government of Nepal also showed similar picture. While increase in number of holdings between 1991/92 to 2001/02 was around 14%, increase in number of poultry between same periods was around 43% (CBS, 2004; CBS, 2008). This trend is catching up since demand for meat continues to increase, as does demand for other poultry products (Walker *et al.*, 2005). In Nepal also the share of poultry meat in household meat consumption as well as overall poultry consumption is growing (FAO, 2002). This increased demand creates favorable environment for the establishment of commercial poultry farms. But there is a lack of information about this business and therefore study of a commercial farm may be important in the present context.

Research has established that there are several benefits from poultry enterprises, even that in the small-scale[2)], therefore commercialization of this business is highly desirable. However, for switching to commercial scale or for entering the business two major problems are assumed to be the barriers. First, the technical knowhow of the growers to operate the large-scale business may not be adequate. However, several researchers found this requisite to be of not much concern. Prabakaran (2003), while conducting his research on the South Asian countries including Nepal, found that although commercial poultry production needs some skill, it can be easily mastered. Similarly, as stated in the ninth five-year plan developed by Government of Nepal, there are many programs to support commercial farmers in case of technical needs (NPC, 2008), hence this is not supposed to be one of the major problems. Moreover, from the pre-survey market research we found none of the farmer stating technical knowhow to be a major hindrance to start this business. This might also be the reason of sudden increase in commercial poultry farmers after 1996.

---

* The United Graduate School of Agricultural Sciences, Tottori University, Japan

* * Shimane University, Japan

Keywords: financial analysis, farm poultry business, profitability, sustainability, Nepal

Second, for commercial farming several researches found the poultry business to have a large capital requirement and high operating costs (Fattah, 1999), suggesting it may not be fully acceptable, especially to resource-poor farmers. Prabakaran (2003) also found lack of credit as a reason for poor performance of poultry industry in Nepal. It may also require frequent cash injections, since up to six batches per year can be grown, which may again rule out the participation of resource-poor farmers. But some form of relationship is assumed to exist between poultry farmers and related industries that may have helped the tremendous growth of this business. Usually in developed countries vertical integration of such firms is seen. However, it is not assumed to be a common practice in developing countries like Nepal; but some kind of relationship might exist. But due to lack of clear picture there is a type of confusing situation. Hence, we think that financial aspect of poultry business is important than other aspects and hence it needs to be analyzed in detail in order to show the clear picture. Moreover, from the pre-survey market research we found farmers stating financial problem to be more important than others. In this context, the objective of this research is to investigate the financial strength, profitability, and sustainability of the poultry business in Nepal. We also explored the level of integration in the emerging poultry market. This research is expected to fill the gaps in the knowledge of some aspects of the poultry business in the case of developing countries, with special reference to Nepal.

2. Methodology

(1) Sampling and data collection

The poultry business, which is becoming a popular enterprise nowadays, especially in the *terai* (plain) areas of Nepal, was selected for this study. It is assumed to be highly profitable, since it is flourishing. However, a proportion of farmers feel it to be too risky to adopt due to its capital-intensive nature. Also, rapid declines in prices may occasionally occur, due to events like bird flu that drastically cut consumption. Because of the lack of research in this field in Nepal, many farmers hesitate to dip their toe into this business, and extension workers are similarly not confident in recommending it. Hence, research exploring the financial strength, profitability, and sustainability of the poultry business in Nepal is necessary. Chitwan district, where the poultry business is being rapidly adopted by farmers, was selected for the study. It lies in the Central Region of Nepal, nearly 140 kilometers north of the capital, Kathmandu, and is typical of the flat plain areas in the northern belt that have fairly well developed infrastructures. There is little problem with market for inputs or sale of products, and is ideal for poultry production, hence our selection of the site.

At the start of the research, we went to the nearby poultry markets where poultry products and/or inputs were being marketed. Several poultry growers who came to this market for various purposes were asked to join the discussion and answer a few questions on poultry farming. A quick appraisal of the poultry business was done with the help of the gathered farmers by discussion of several factors like inputs, outputs, prices and costs, scope of the business, associated problems, and so on.

Using this basic information, a representative grower was then selected for a detailed study. Hence, the Nepalese poultry business was analyzed by direct interview with the selected farmer as well as verification at the farm, whenever required. Detailed data on the poultry business, including income, expenses, and inventory were recorded. Several visits were made to collect the required data regarding the poultry business for a single year, 2001. Since, farmers in Nepal do not keep records of their business we are unable to get data on multiple years. We also assumed that attempt to get multiyear data may be unworthy due to straightforward recall year that is less reliable than single year data. Due to low levels and the relatively slow pace of development because of the political instability in Nepal, we expect the data to be equally relevant to the current poultry business.

For the analysis of data, different business statements were prepared. Similarly, with the help of several profitability ratios, financial ratios, liquidity ratios, and solvency ratios, the financial strength of the business was analyzed. Capital budgeting, also known as investment analysis, was also performed to investigate the profitability of the business. Finally, inflation analysis and sensitivity analysis were carried out to measure the related risks and the sustainability of the business when exposed to adverse conditions like inflation, fluctuations in price leading to increased costs, and decreased selling price of the produce.

(2) Descriptive statistics

The selected grower was a young person around 22 years old, had completed higher secondary education, and was enrolled at a university. The family had started this business around three years previously around 1997/98 with personal assets of around 3 million NRS (Nepalese Rupees: approximately equivalent to ¥5 million or $43,000) consisting of NRS 1 million worth of land and 2 million worth of poultry housing. For operating expenses, they obtained a loan of NRS 2 million for a period of 5 years at a rate of around 18%. Yearly, they had to pay the sum of NRS 0.40 million plus interest. Since it was the third year, the remaining amount of the loan was NRS 1.20 million and the interest for the year was around NRS 0.22 million. The family raises 16,000 poultry birds per season, each lasting around 2 months, and raised a total of 96,000 poultry birds in the previous year. Before adopting poultry farming as their main occupation, they were like average Nepalese farmers growing rice and wheat. At the time they started the business, poultry farming had been gaining in importance as a highly profitable business, which attracted this family to this profession. Also, the government of Nepal prepared the ninth five-year plan that focus on supporting commercial livestock production including poultry farming by providing several facilities like extension and so on. This also influenced the farmer to reap the benefit by starting the business. They separated some of the land for poultry farm construction and soon started the business. The grower is currently employing three permanent workers along with one permanent family member who takes care of the business.

As soon as the business was established, they come into contact with the local feed industry that was interested in drawing up contract/agreement with them for mutual benefit. Since the agreement had no demerits, and was helpful in several ways, the grower immediately accepted the proposal. Under this contract, the grower did not need to search the market for their produce, since the feed industry mediates in this process. In addition, the feed industry provides them necessary feed, litter, and other produces, on credit if required. The farmer can also directly sell his produce without the intermediation of the feed industry if he wishes to do so. In this case, usually nothing untoward happens, since the feed industries also need customers and hence may be willing to give credit even without a contract. Actually, this is only a side business of these industries, in which they make use of their contacts with the intermediate marketing process to gain a slight margin and make some small profits. However, integration benefits both parties, since the feed industries have been there for several years and have knowledge of the market, and for the newcomers it will usually be beneficial to come to an agreement with them and avoid the lengthy and tedious process of market search. Prabakaran (2003) also found market search and marketing to be one of the most important problems. Hence, if this problem is solved as stated above by the agreement with feed industries the barriers to entry into this business will be reduced, even for resource-poor farmers. Only a little capital investment for infrastructural development may suffice, which may again be available through the existing financial institutions with few preconditions.

3. Results and discussion

The balance sheet showed the net worth of the selected poultry business to be around NRS 3.37 million (Table 1). Thus, the firm has an excess of assets over debts and is in a good financial position. Their income statement showed that the total cash payment made by the firm is nearly NRS 9.52 million, and cash receipts are nearly NRS 10.56 million. Thus, the firm is achieving net cash earnings of NRS 1.03 million. Adding the family consumption of around NRS 12,000 per year, net farm earnings come out at NRS 1.04 million. Since, the farmer indicated that the opportunity cost of the labor he is contributing to the farm may be around NRS 100/day, and if we assume NRS 100/day as the opportunity cost of the labor provided by one family member working on a permanent basis, returns to management are NRS 1.01 million. All these values show a positive net income from the poultry business. A study of the cash flow statement (not shown) revealed that earnings from poultry come after two months, whereas the costs are incurred in the first month for buying chicks and feed. However, there seems to be no shortage of cash throughout the year due to bimonthly cash earnings from the poultry business. In addition, the feed companies are willing to provide the required inputs on credit. In spite of this, some farmers claimed that new entry is risky, especially for resource-poor or small-scale growers, due to credit constraints and lack of networking with these institutions in the initial stages of business establishment.

Table 1: Reduced-form Balance Sheet and Income Statement (2001) [3)]

Balance Sheet			
Assets	Amount (NRS)	Liabilities	Amount (NRS)
Current	1,205,350	Short-term	425,000
Working	513,740	Mid-term	800,000
Fixed	2,880,000	Long-term	-
Total	4,599,090	Total	1,225,000
Net worth			3,374,090
Income Statement			
Income	Amount (NRS)	Expenses	Amount (NRS)
Product	10,368,000	Operating	9,195,240
By-product	192,000	Fixed	333,300
Total	10,560,000	Total	9,528,540
Net cash earnings			1,031,460
Net farm earnings			1,043,460
Returns to management			1,006,960

The profit margin was found to be around 10% and gross profit margin around 13% (Table 2). These values are considerable, given the capital-intensive nature of the poultry business. Similarly, the rate of return on capital, rate of return on equity, and rate of return on assets were found to be around 25%, 31%, and 22%, respectively, indicating that there is a high rate of return on the investments made by the farmer, even though the profit margins are not very high. One probable reason may be the volume of the business. Since about six batches of poultry can be grown each year, the business cycle is short and the return on investment is high.

The financial ratio also showed that the business needs a huge amount of cash. The operating ratio was found to be around 87%, indicating that it is a capital-intensive business, since most of the costs incurred are current costs. This is to be expected, because poultry feed accounts for a large proportion of expenses. Fixed ratio and gross ratio could also be considered in the desirable range (3% and 90%, respectively) for a capital-intensive business like poultry. The asset turnover ratio was found to be around 230%, implying that this amount could be earned per year over the business asset. This shows that the farm is obtaining a high turnover for its assets and is therefore financially viable. However, the requirement of a great deal of operating cash may create a barrier to commercial adoption by resource-poor farmers unless they can obtain loans easily or support from the local feed companies, as stated earlier.

Table 2: Profitability and financial ratio analysis

Parameter	Estimation equation	Observed value (%)
Profitability ratio		
Profit margin	(Income – Expenses) / Income	9.76
Gross profit margin	(Income – Cost of goods sold) / Income	12.92
Rate of return on capital	(Income – Pretax Expenses) / Capital	24.55
Rate of return on equity	(Income – Expenses) / Net Worth	30.57
Rate of return on asset	(Income – Expenses) / Assets	22.43
Financial ratio		
Operating ratio	Operating Expenses / Income	87.08
Fixed ratio	Fixed Expenses / Income	3.16
Gross ratio	Total Expenses / Income	90.23
Asset turnover ratio	Income / Assets	229.61

The liquidity ratio shows that the farm is not under threat in the near future and would be able to pay all its debts if required (Table 3). Current ratio was estimated to be 2.84, hence the business has nearly three times current assets to pay current debts. Since the value is much higher than the desirable range of 2:1, it might imply slack management practice and hence inefficiency, which is common in Nepalese firms. With the same investment, the level of business could have been increased. An Acid test shows the ratio to be near 1.42; hence the firm is financially strong but again it is somewhat higher than the expected range (1:1) and is an indication of inefficiency. The working ratio and net capital ratio were found to follow similar patterns (around 1.40 and 3.75, respectively). Hence, the problem with this business is not with the ability to pay debts but with slack management practices. It is more liquid than necessary. The excess cash can be used efficiently for other purposes like increasing the volume of business.

Debt to equity ratio, equity to value ratio, and debt to asset ratio were found to be around 41%, 65%, and 27%, respectively, indicating that the owner's equity is greater than the total liabilities and in the near future there would appear to be no problem with the financial solvency of the business. Similarly, the 65% share of farmers in total assets shows high solvency. Liabilities are only around 27% of total assets; hence the business is in a strong position at present.

Table 3: Liquidity and solvency ratio analysis

Parameter	Estimation equation	Observed value
Liquidity ratio		
Current ratio	Current Assets / Current Liabilities	2.84
Acid test ratio	(Current Assets – Inventory) / Current Liabilities	1.42
Working ratio	Working Assets / Working Liabilities	1.40
Net capital ratio	Assets / Liabilities	3.75
Solvency ratio (%)		
Debt-equity ratio	Liabilities / Equity (= leverage ratio)	40.83
Equity-asset ratio	Equity / Assets (= percent ownership)	65.23
Debt-asset ratio	Liabilities / Assets	26.63

The simple rate of return (SRR) of the business was found to be around 20% (Table 4). This can be considered satisfactory, since it also includes capital investment by the farmer (RRR = required rate of return = 8%). Excluding the farmer's equity, SRR was found to be around 50% (not shown), quite a lot higher than the RRR (20%). The estimated payback period (PP) comes out to be less than 5 years if equity is included, whereas for the debt portion only it is around 2 years (not shown), both of which seem quite reasonable. The estimated net present value (NPV) of the farm, taking ten years as the period, was found to be nearly NRS 1.32 million, which is greater than zero, hence the business is acceptable[4]. Similarly, the internal rate of return (IRR) and benefit-cost ratio (B-C ratio) is found to be 32.43% and 1.07 respectively. IRR is higher than the RRR, and the B-C ratio is more than 1, hence we can say that the business is gaining reasonable profits. One can also see that the interest rate used for this analysis is considerably higher and also includes equity (RRR = 8%); hence even a slight decrease in these values will not reduce the appeal of this business.

Calculations for the break-even point (BEP) show that the firm will attain its BEP (for fixed costs) when it produces 0.02 million units of poultry or when it makes a sale of NRS 2.58 million. Again, the BEP for the overall business investment is 0.46 million units of poultry birds (0.18 million units if the owner's equity is excluded: not shown), which turns out to be sales of NRS 51.19 million (NRS 20.47 million if the owner's equity is excluded: not shown). Assuming around NRS 10.56 million per year in sales, the farmer will meet the break-even point for the business shortly after the fifth year if owner equity is included or after the second year if it is not.

Table 4: Business analysis [5), 6)]

Parameter	Observed value
SRR (%)	19.83
PP (years)	4.84
NPV [a]	1.32
IRR (%)	32.43
B-C ratio	1.07
BEP production (fixed costs) [b]	0.02
BEP sales (fixed costs) [a]	2.58
BEP production (capital) [b]	0.46
BEP sales (capital) [a]	51.19

Note: [a] = million NRS; [b] = million units

The sensitivity of the business when exposed to adverse conditions were analyzed (Table 5). First, we were interested to see what would happen to the business if there were changes in the value of money, that is, inflation. For analysis purposes, we adopted an inflation value of around 4% (NPC, 2001: calculated inflation of 1999/2000 to be around 4.2%, hence we used this value for simplicity purpose). The estimated values for NPV, IRR and B-C ratio come out at approximately NRS 0.69 million, 27%, and 1.07 respectively. NPV shows a high positive value, IRR is greater than the RRR, and the B-C ratio is greater than unity, hence we can say that the project would be beneficial even if price inflation was running at 4%.

Again, simulations are done for the sensitivity analysis, regarding changes in income and expense figures. Although the prices of both inputs and outputs are likely to change in the same direction, we assume an increase in cost of the inputs of 1% and a decrease in the price of output of 2%. Since the input price does not fluctuate more, the lower values are adopted. Similarly, we assume a year where there is not much fluctuation in the price of output unless severe events, like an outbreak of bird flu take place. Results again showed the NPV, IRR and B-C ratio to be in the desirable range. Here, NPV comes out positive (NRS 0.04 million), IRR is greater than the RRR (20.44%), and the B-C ratio is higher than unity (1.04); hence the business is predicted to be profitable even under adverse conditions. All these calculations include farmer's equity, hence the values appear higher and reasonably acceptable, with little risk.

Table 5: Sensitivity of the business to adverse conditions

Condition	Inflation @ 4%	Increase in costs @ 1% and decrease in price @ 2%
NPV [a]	0.69	0.04
IRR (%)	27.26	20.44
B-C ratio	1.07	1.04

Note: [a] = million NRS

4. Conclusion

Poultry is an important part of rural life in several developing countries. Commercialization of this business appears more beneficial but has not obtained the expected momentum, mainly due to lack of information and perception of high cash requirements and thus risky nature. Although the technical knowhow may also be one of the barriers, it is not assumed to be restricting, as found from previous researches as well as pre-survey data of this research. Hence, we study the most frequently admitted problematic side of the business, that is, financial aspect. Discussion with the farmers of Chitwan district in Nepal formed the basis of this research, followed by a detailed business analysis of a commercial poultry grower. Analysis revealed the business to be profitable, sustainable, and less sensitive to adverse conditions.

The positive and high value of net worth shows that the business is in a strong position. Again, the financial ratio, liquidity ratio, and solvency ratio showed that the business is on a strong foundation, is capable of repaying its loans anytime if demanded, has sufficient liquid balance, and is financially viable. Net cash earnings are also positive, along with considerable profits as shown by the profit margins. Simple rate of return on investments is also high, hence the business could be said to be earning high profits. A business analysis over a period of ten years showed that the net present value of the business is greater than zero. The internal rate of return is also higher than the market interest rates as well as the required rate of return for both total investment and the debt portion of investment. The benefit-cost ratio is higher than unity, an indicator of significant profits, hence showing that the business is acceptable. Sensitivity analysis of the business to adverse conditions like inflation or changes in the cost of input as well as price of output showed that the business is also viable under these unfavorable conditions. These analytical results, taken together, give sufficient evidence in favor of the profitability and sustainability of the commercial poultry business.

Our analysis also showed that large-scale production is highly cash demanding, although the short business cycle of two months reduces the risks as well as possibly overcoming the difficulties of frequent cash requirements. Also, the high cash requirements may be substituted by integration with the local feed industries that are usually willing to provide poultry feed on credit. It is important since poultry feed shares around 70% of the cash requirements. Moreover, by use of contracts and for a small share of the profits, these industries may help the farmer find markets. These provisions may also help the establishment of new farmers, since assured marketing reduces risk during the initial phase of establishment. This unique relationship seen in the poultry market

may explain the popularity of flourishing poultry enterprises in the selected area as well as showing scope for further growth. Hence, we also recommend farmers to integrate with these local industries to reap the benefits of their contacts, at least in the initial stages of business establishment. Also, for newcomers, appropriate policies for facilitating credit may again be required to break the entry barrier due to the considerable initial investment required for poultry houses and other outlays needed for commercial farming.

From the analysis of the selected grower, there appears to be some slackness in management practice on the part of Nepalese growers and hence it is recommended to increase the volume of the business and reduce liquidity in hand. This means that with the same level of investment, profits can be increased by increasing the scale of the business. It is also recommended, since local feed industries are willing to provide their products on credit and growers may not need much cash. In other words, to maintain the same level of business, less capital investment might have sufficed and again this shows that capital may not be a barrier to entry. Since the business seems quite profitable, further research is recommended to identify the optimum levels of production and other factors for maximization of profits. Although this study is vital since there is a lack of information but it is only a preliminary one and assumed to be the first step that highlights a success story. However, we would like to recommend further research to verify our findings as this research is based on a single business as well as on a single year.

Notes

1) Commercial poultry farming comprises of the raising of poultry birds for the purpose of sale in the market. In such farms the product are rarely consumed by the growers or consumed at low scale.
2) In Nepal like in other developing countries, poultry farming that involves raising a few chickens in the yard is a common practice in rural areas even at present. This type of backyard poultry farming comprise of raising few poultry birds for the purpose of home consumption. Raising a few poultry birds using a scavenging system of this nature requires little capital, hence may be a potentially profitable enterprise for a diversified household (Dhaubhadel, 1992). Research has found up to 600% returns from these types of poultry farming (FAO, 2006). Even if the birds need to be fed with grain, the turnover ratio is higher than with other livestock animals (Walker *et al.*, 2005). Moreover, raising poultry may add meat to the diet of these households (Dhaubhadel, 1992; Gondwe and Wollny, 2007). Poultry is an important source of animal protein which can add significantly to household protein intake (Mallia, 1999; Permin *et al.*, 2001; Walker *et al.*, 2005). Having several poultry birds may be a strong determinant of household food security, especially for rural households in a developing country (Thomsen *et al.*, 2005). Hence, household nutrition and food security is strongly supported by availability of poultry in the household (Fattah, 1999; Sonaiya, 2007). Research has also established that a few poultry birds in the household may have a significant effect on household income level and welfare (Thomsen, 2005). In particular, research has shown significant benefits to woman and child (Permin, *et al.*, 2001). Thus, poultry farming

has been found to have strong poverty-alleviating effects (Walker *et al.*, 2005; Sonaiya, 2007), especially for disadvantaged groups like the landless, women, and children (Fattah, 1999). Income from these enterprises may also provide capital for investment in other sectors, thus indirectly providing the benefit of creating a favorable environment for rural households to increase their overall income and hence living standards (Thomsen, 2005; FAO, 2006). Other indirect benefits like manure production in the form of poultry litter, and scavenging insects and worms from the soil may benefit agricultural enterprises (Dhaubhadel, 1992).

3) Farm supplies and marketable poultry were valued at market price. Farm equipment and other fixed assets were valued using the cost-minus-depreciation method. For land we did not used depreciation but in case of poultry building we used depreciation at the rate of 2%. This assumption is done because in the developing countries like Nepal infrastructures like buildings are used for a long period of time, that is, until it could be used.
4) For calculating the NPV of the business, an interest rate equal to RRR (20%) is used as base.
5) In all these calculations, both the investment of the farmer (equity portion) and the loan (debt portion), which have varying RRR, are considered. The RRR on the loan was stated to be around 20% (since the interest on the loan is around 18% + 2% risk premium), whereas on the equity RRR was stated to be around 8% (interest rates one could get from the deposit in the financial institutions were around 5-6% + 2% risk premium). Hence, even for slightly lower values than the estimated ratios, this business appears not to lose its appeal.
6) Formulas for calculating the ratios used in the analysis:
   - SRR = (Profit – Depreciation) / Capital
   - PP = Capital / Profit

   Where, Profit = Income – Expense

   - $NPV = \sum_{t=1}^{n} (B_t - C_t) \Big/ (1+i)^t$
   - $IRR = LDR + DDR + (PV\_LDR / SPV\_TDR)$
   - $B - C = \dfrac{\sum B_t/(1+i)^t}{\sum C_t/(1+i)^t}$

Where, t = 1...n represents time period; B_t = benefit stream at time t; C_t = cost stream at time t; i = discount rate (interest); n = number of years; LDR = lower discount rate; DDR = difference of discount rates; PV_LDR = present value of incremental net benefit at LDR; SPV_TDR = sum of present value of incremental net benefit at two discount rates (sign ignored).

- BEP (fixed costs) = (Fixed Expenses / Profit per unit sale) x Sale price per unit

- BEP (capital) = (Capital / Profit per unit sale) x Sale price per unit

Where, profit per unit sale = price per unit – variable costs per unit

References

[1] CBS, "National Sample Census of Agriculture 1991/92", http://www.cbs.gov.np/Agriculture/Agriculture%20Census1991/tab10h.htm, Assessed on 2008/01/19, 2008.

[2] CBS, "National Sample Census of Agriculture 2001/02", http://www.cbs.gov.np/Agriculture/Agriculture %20Census2001/Nepal/Tab10m.htm, Assessed on 2008/01/19, 2004.

[3] Dhaubhadel, T. S., "The role of monogastric and small stock", In: J .B. Abington (Ed.), "Sustainable livestock production in the mountain agro-ecosystem of Nepal", Animal Production and Health Paper 105, Food and Agriculture Organization of the United Nations, Rome, 1992.

[4] FAO, "Assessment of the world food security situation", CFS: 2006/2, Committee on World Food Security, Thirty-First Session, held on 30 October – 4 November, 2006, Rome, 2006.

[5] FAO, "FAOSTAT", http://faostat.fao.org, Assessed on 2008/01/18, 2008.

[6] FAO, "Some issues associated with the livestock industries of the Asia-Pacific region", RAP publication no. 2002/06, Food and Agriculture Organization of the United Nations, Regional Office for Asia and the Pacific, 2002.

[7] Fattah, K. A., "Poultry as a tool in poverty eradication and promotion of gender equality", In: F. Dolbeng and P. H. Peterson (Eds.). Proceedings of the workshop on "Poultry as tool in poverty eradication and promotion of gender equality" held from March 22 – 26, 1999 at Tune Landboskole, Denmark, 1999.

[8] Gondwe, T. N. and C. B. A. Wollny, "Local chicken production system in Malawi: household flock structure, dynamics, management and health", Tropical Animal Health and Production, volume 39, issue, 2, 2007, pp. 103-113.

[9] Mallia, J. G., "Observations on family poultry units in parts of Central America and sustainable development opportunities", Livestock Research for Rural Development, volume 11, issue 3, Online electronic edition, http://www.cipav.org.co/lrrd/lrrd11/3/mal113.htm, 1999.

[10] NPC, "Interim poverty reduction strategy paper", National Planning Commission, Government of Nepal, Kathmandu, Nepal, 2001.

[11] NPC, "Ninth Plan 1997-2002", http://www.npc.gov.np/plan/contents/english/Chapter_10.pdf, Assessed on 2008/01/18, 2008.

[12] Permin, A., G. Pedersen, and J. C. Riise, "Poultry as a tool for poverty alleviation: opportunities and problems related to poultry production at village levels", In: R. G. Alders and P. B. Spradbrow (Eds.). Proceedings of the workshop on "Newcastle disease control in village chickens" held from 6-9 March, 2000 at Maputo, Mozambique, 2001.

[13] Prabakaran, R., "Good practices in planning and management of integrated commercial poultry production in South Asia", FAO Animal Production and Health Paper 159, FAO, Rome, 2003.

[14] Sonaiya, E. B., "Family poultry, food security and the impact of HAPI", World's Poultry Science Journal, volume 63, issue 1, 2007, pp. 132-138.
[15] Thomsen, K. A., C. Chrysostome, and F. M. Houndonougbo, "Strategies for income generation and marketing within the local context – the case of smallholder poultry production and micro credits in Benin", Paper presented at the workshop "Does poultry reduce poverty and assure food security? – a need for rethinking the approaches" held on 30-31 August, 2005, Copenhagen, Denmark, 2005.
[16] Walker, P., P. Rhubart-Berg, S. McKenzie, K. Kelling, and R. S. Lawrence, "Public health implications of meat production and consumption", Public Health Nutrition, volume 8, issue 4, 2005, pp. 348-356.

和文要約

途上国における養鶏業の収益性と持続性
―ネパールの養鶏業者を事例として―

キラン プラサド バッタ・石田章・谷口憲治・ラクシャサ ルマ

いくつかの途上国では、経済発展に伴う所得向上によって鶏肉消費が急速に拡大しており、養鶏経営の大規模化や垂直統合が進みつつある。しかし管見の限りでは、途上国における大規模養鶏経営の収益性や持続性については十分に実態調査が行われていない。そこで本稿では、鶏肉生産が急拡大しているネパール・チットワン郡の平野部を調査地として養鶏業者の経営データを詳細に検討することによって、大規模養鶏経営の収益性と持続性を明らかにすることを主たる目的とした。

年間 96,000 羽（2 ヵ月間に 16,000 羽×年 6 回飼育）のブロイラーを飼育している大規模養鶏業者の経営分析を行ったところ、次のような結果を得た。

□調査対象の大規模養鶏業者によると、資材供給会社は一部後払いで鶏雛や養鶏用飼料を供給してくれると同時に、成鶏の出荷先も確保してくれるとのことであった。この事実から、ネパールの調査地における養鶏業においても、ある程度の垂直統合が進んでいると推察される。

□貸借対照表を作成した結果、資産額と負債額は各々459.9 万ルピー（1 ルピー＝1.5 円～1.6 円）と 122.5 万ルピーであり、純資産額は 337.4 万ルピーであることが明らかとなった。また養鶏の損益計算から、年間収益は 100 万ルピー程度であると推定できる。これに加えて、財務比率、流動性比率、ソルベンシー比率、投資の収益率等の各評価値も概ね良好であった。さらに、内部収益率が市場利子率と要求収益率（required rate of return）を上回っていること、損益比率が 1 を上回っていること、投入資材の価格上昇などの悪条件に対して脆弱でないという感度分析の結果なども勘案すると、ネパールの調査地における大規模養鶏経営は収益性が高くかつ持続性があると考察できる。