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Performance of Vertically Integrated Contract and Independent Poultry Farms in Bangladesh : A comparative study

Ismat Ara BEGUM, Fumio OSANAMI, and Takumi KONDO

Summary

The present study was undertaken to examine and compare the cost and return, labor utilization, risk and constraints related to production, marketing etc., of vertically integrated contract and independent poultry farms in Bangladesh. The primary data were collected from 50 sample farm of ABFL, the pioneer vertically integrated farm, kishorganj and 25 independent sample farms from Gajipur, the poultry region of Bangladesh. The findings of the study revealed that although the independent farms were able to take advantage from favorable market price of broilers as compared with the contract farmers but the contract farmers were still better off in their net income since the guaranteed market, risk share and major cash inputs and technical knowledge were provided by the integrators. Contract grower's net farm return was much higher than that of the independent farmer. The average labor utilization of contract farms was also higher than that of independent farm. Moreover, contract farmers often gained financial, managerial and marketing assistance, plus a reduction of risks normally borne by the independent grower.

1. Introduction

Bangladesh is a country of serious malnutrition and food insecurity; about 25 percent population is identified as hardcore poor and 48 per cent lives below the poverty line (Household Expenditure Survey, [5]). Protein deficiency has been taken as the major contributory factor in malnutrition. The protein consumption from animal origin in Bangladesh is significantly lower than other countries. Consumption of animal protein is only 11.8 grams (BBS, 2001 [9]) per capita per day where as the standard

requirement of 36 grams as recommended by UNO (Ahmed and Islam, [3]). Bangladesh, a country burdened with serious problem of high unemployment, poverty and malnutrition, needs a special and comprehensive approach to reduce these acute problems. Poultry sub-sector is considered an important avenue to reduce these problem.

Although commercial poultry started 1980 but still now meat deficiency is 89.5% (Table 1) and only 14% meat comes from commercial farming system (Alam, [4]). Presently, major portion of total poultry meat supply comes from scav-

Table 1. Total meat Availability and deficiency in Bangladesh

	meat (all)
Total yearly Requirement per capita	43.80 kg/year
Total Per capita availability	4.57 kg/year
Total Per capita deficit	39.23 kg/year
Percentage of Deficit	89.50%

Source : Poultry Khamar Bichitra, Poultry business directory, Year Book 2003 ([27])

Note : 1) The deficit of meat means all meat coming from livestock sources

2) Poultry meat alone contributes 37% of total meat (Ahmed and hamid [2],; Haque, [17])

enging or traditional farming system.

Through contractual arrangements, agro-industry can assist developing countries farmers to shift from subsistence or traditional agriculture to commercial or modern agriculture. This has not only the potential to increase incomes of contracting farmers but also to have multiplicative effects in the broader economy. Risk is an important feature of the poultry farming. There are two types of risk in poultry production. One is production risk and another is price risk. Risk sharing is one of the most widely cited reasons for contracting. Numerous studies of contract farming have emphasized risk reduction as a principal incentive for producers to enter into contracts (Covey and Stennis, [12]; Dornbush and Boehlje, [13]; Herbert and Jacobs, [19]; Lawrence and Kaylen, [26]; Johnson and Foster, [22]; Knoeber and Thurman, [25]; Roy, [31]).

Developing countries have established agricultural insurance programs not only to provide farmers with one risk management tool but also to promote other goals, such as improving farmer's access to credit, promoting production with higher production risk and related industries. There have been quite varying degrees of success over the years, across countries and across several types of insurance programs (Hazell et al., [18]; Hueth and Furtan, [20]; Mishra, [29]).

Contract farming has recently been introduced in Bangladesh in 1994 by a big Company, named ABFL (Aftab Bahumukhi (multipurpose) Farm Ltd). Broiler production is organized by this large company that contract with individual growers. Contract farming offers several potential advantages over independent farm. Contract may serve to lower transaction cost associated with search and lower income risk for growers. In addition, contracting may raise farm profit by improving the quality of managerial inputs by speeding the transfer of

technological information to growers or by facilitating grower's access to credit, thereby permitting the adoption of newer, more efficient technology. Although there are a limited number of studies (Karim and Mainuddin [24]; Ahmed [1]; Haque [16]; Islam and Shahidullah [21]; Ukil and Poul [33]; Bhuiyan [10]; and Uddin [32]; Yasmin et.al [34]) on production and economic aspects of commercial independent poultry farm but research work on contract farming is not plentiful. So far only a few studies (Chowdhury, [11], Karim, [23]) have been done on benefit-cost analysis of contract farming system. It is important to identify and measure the farm returns and risk reduction, if any that can be attributed to contracting. The objectives of the study is to evaluate the comparative performance of vertically integrated contract and independent poultry farming system in Bangladesh by analyzing the cost and return, labor utilization, risk and constraints related to production, marketing etc.

The next section of the paper describes the research methodology used in the study. The third section discusses the existing vertically integrated contract poultry farming system in Bangladesh. Section four discusses socio-economic characteristics of sample farmers. Before find out the comparative cost, return, labor utilization and risk this study also focused on the reasons behind farmer's motivation to enter contract farming system. These reasons are briefly discusses in section five. Then, section six deals with the results and discussions. Finally, conclusions are drawn based on the results and discussion.

2. Methodology of the study :

The primary data of vertically integrated contract farming were collected from two sub-districts-Bajitpur and Kuliarchar, that located in Kishorganj district. A stratified random sampling technique was followed in this study to se-

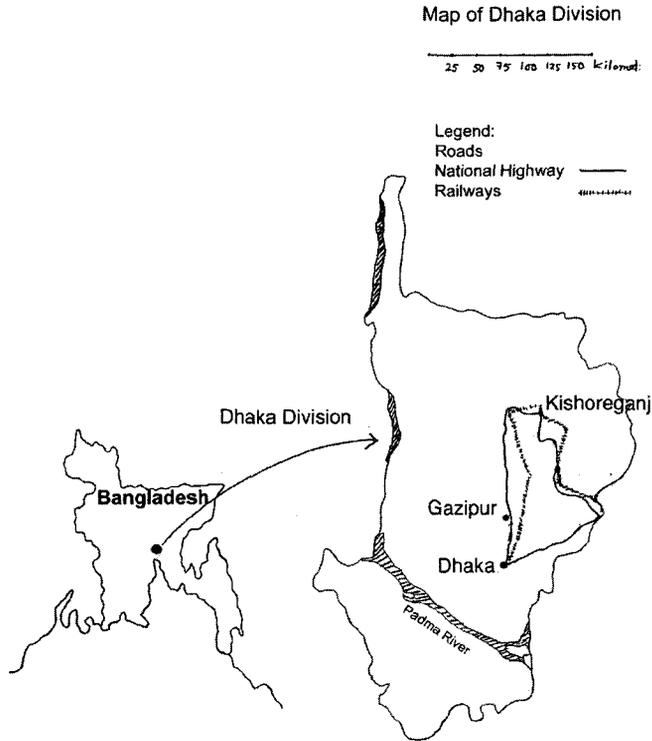


Figure 1 . Map of the Study Area

lect a sample size of 50 farms. In order to spread the sample over the entire study population, a list of all categories of 560 contract growing farmers were prepared with the help of officials of ABFL. Then 50 broiler farms under contract farming system were selected randomly. For a comparative analysis, as Gazipur district was declared by Government of Bangladesh as poultry region, so this district was selected purposively as study area for independent farm. Then a field's survey was carried out on 25 commercial poultry farms that were selected randomly from Kaliakoir and Sripur thana under Gazipur district. Figure 1 indicates the map of study area. In the period of investigation of this study covered a one year beginning from December 2001 to November 2002. Data were collected from December 2002 to January 2003. Tabular analysis was adopted to analyze the costs, returns, profitability and revenue risk

variability of farming system.

3. Vertically Integrated Contract Farming System in Bangladesh :

Contract in broiler production means agreements between farmers and companies that specify conditions of producing and marketing broiler. There are generally two types of contracts—Marketing contracts and Production contracts. Marketing contract refers to agreements between a contractor and a grower that sets a price and the market outlet for the broiler before the broiler is ready to be marketed. Most management decisions remain with the grower. In case of Production contract, the quality and quantity of broiler inputs to be determined and supplied by the contracting firm. The type of compensation that the grower will receive for services is also decided by the contractor. In marketing contract, only price risk is shared

whereas in production contract, both production and price risk are shared by the grower and contractor. The contractor may have more control over production decisions depending on the type of production contract.

The term 'Contract' in broiler production may vary from country to country and the nature of the integrator company. In most of the developed countries contract farming system in broiler production was started before 1960 but in Bangladesh it was started in 1994 through Aftab Bahumukhi Farms Limited (ABFL). ABFL is one of the leading poultry farm in Bangladesh under the Islam Group Ltd., Dhaka, Bangladesh. It was established in 1991 at Bahgalpur, Bajitpur in the district of Kishoregonj, about 110 km northeast of Dhaka City. ABFL introduced contract growing system of commercial broiler as an experimental extension program whereby at first selected 20 farmers, who had to enter into an agreement (Contract growing) with the ABFL on production and marketing of Broiler products.

In most of the developed and developing country, in contract broiler farming system the grower usually provides land and housing facilities, labor, and other operating expenses such as repairs and maintenance, manure disposal, and chicken house cleaning. The integrator/contractor provides chicks, feed, veterinary supplies, management services, and transportation. Expenses for fuel and litter disposal can be shared or paid by either party, depending on the specifications of the contract. Broiler contracts usually provide three types of compensation for growers : (1) the base payment (fixed fees per kg of broiler) , (2) an incentive or performance payment (a percentage of the difference between average settlement costs of all flocks contracted during a specific period and costs associated with an individual grower) , and (3) terms

for any disaster payments. (Martin [28], ; Little et. al [27]).

The vertically integrated contract farming system has been criticized for affecting small farmers' welfare. It is also criticized for reduces farmer autonomy (Gillespie and Eidman [14]). It is reported that the total number of poultry farm has been decreased in the developed countries like Japan, USA and Canada after introducing the vertically integrated contract farming system. Even in Thailand, in the mid - 1990s 80 percent of the poultry production came from only ten large companies. The contract farming system, introduced in Bangladesh through ABFL. According to ABFL's contract the number of batch and birds and quantity of inputs as well as managerial decision is taken by the farmer. Thus this system protects farmer's autonomy. In Bangladesh most of the farmers' are very poor and small holder. They have abundant family labor but limitations of working capital. Moreover, according to the poultry development policy of Bangladesh (GOB [15]), establishment of large scale poultry farm has been restricted for protecting the interest of small farmers. Considering all these things and for the well being of the small farmers' AFBL include small farmer into the contracting system.

The vertical stages of ABFL on broiler contract farming system in Bangladesh have been shown in figure 2. The agreements between ABFL and the farmer are very simple indeed. According to the agreement ABFL provides the day-old-chicks, feeds, veterinary supplies by kind on credit, and implements the final marketing of the output. ABFL also provide day to day technical assistance about chick rearing, feed rationing and disease control through their expert supervisor as service. The contract farmer typically provides the space and facilities (land and housing) , equipment, labor (fam-

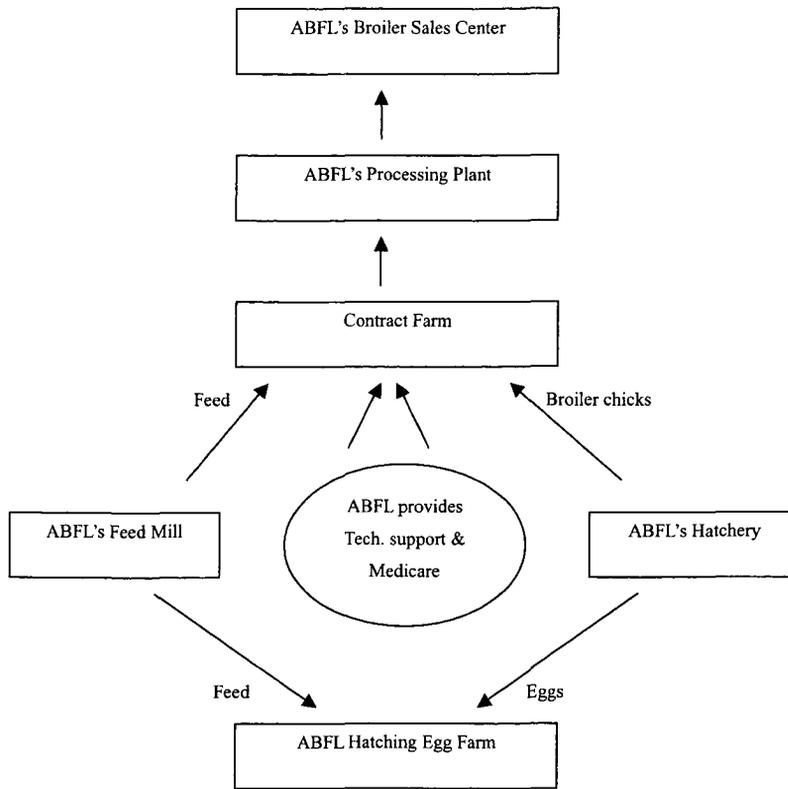


Figure 2 . The Vertical Stages of ABFL on Broiler Contract Farming

ily and/or hired) and daily farm management. Any farmer in the company located area is eligible to enter in ABFL contract system if and only if they could provide housing, equipment and labor facility. However, the number of birds per batch to be reared and managerial decisions are taken by the farmers. The average duration of the grow-out cycle is roughly 5 to 7 weeks for an average sized (1.5kg). ABFL buy the mature broiler from the contract farmer by paying a predetermined price for per Kg of live broiler and then market these broilers through ABFL sales centers in Dhaka. All the credit liability of the contract farmer is adjusted against price of their products. Since contract farmers are compelled to buy the ABFL's day-old-chick and feed, so ABFL has assured its product market by the contract farming system.

4. Socio-Economic Profile of the Sample Poultry Farmer

This section presents the characteristics of the independent and contract poultry farm surveyed. Table 2 represents the mean values for independent and contract farmer's characteristics. The table highlights the differences between two groups. On average, contract farmers are older and have less experience in poultry business. Contract farmers are also more likely to have poultry as their main occupation. Independent farmer has more land compare to contract farmer, although both are under small farm category (in Bangladesh land holdings less than 2.5 acre belongs to small farm category). About 26% of sample contract farmers had experience of commercial poultry rearing before they enter into contracting system, else are started the business as a contract farmer.

Table 2 : Characteristics of Household head / Decision maker of Independent and Contract farm

Entry	Independent Farm	Contract Farm
Age (years)	32.56	41.46
Education (no. of years)	7.96	6.70
Main Occupation (%)	64	70.00
Secondary Occupation (%)	36	30.00
Total Land Holdings (decimal)	233.52	172.74
Experience in Broiler Farming (years)	4.48	4.45
Engaged in Contract Farming (years)	N.A	3.54

Source : Field survey, 2003.

Note : 1) Sample size of independent and contract farms were 25 and 50, respectively.

2) N.A. = Not Applicable.

3) 1 Acre = 100 decimal.

Table 3 : Reasons Behind Entering Contract Farming System

Reasons	No. of Respondents	Per cent
Lack of Capital	25	50
Risk Reduction	13	26
Additional Income	5	10
Lack of Marketing Facility	5	10
Lack of Technical Knowledge	2	4

Source : Field survey, 2003.

Note : Results were obtained from 50 sample farmers

5. Motivating Reasons behind Entering Contract Farming

As a developing country where majority of the people are under poverty level, the farmer's decision to enter in contract may have been motivated by some benefits from contracting. Risk and uncertainty are quite common facts of poultry business. Different constraints as faced by independent farmers have pointed out and those problems are lack of capital, inadequate knowledge of poultry rearing, outbreak of diseases, inadequate availability of inputs, inadequate institutional credit, guaranteed and profitable markets for output etc. These problems and constraints motivate the independent farmers to enter in contract farming system.

Table 3 reflected the reasons why farmers entered in contractual agreement. This table mentioned only the first motivating factor to enter contract farming system. Farmers' enter contractual arrangements for a number of reasons.

The primary reason is lack of capital. About 50% of respondent mentioned this reason as a first motivating factor. Risk reduction is the next reason, indicating by 26% of the respondents. The need for more income and lack of marketing facilities were the third most important reason for entering contractual agreements. About 4 %of respondents also mentioned the lack of technical know-how as a first motivating factor. The main motivating factors are discussed in below.

(i) Credit Facility

Lack of capital is the first most frequently cited reason for entering contractual agreement. Farmers require initial capital to establish a poultry farm and they also need cash to meet day-to-day expenses. Most of farmers mentioned lack of capital problem. Capital constraint was an acute problems because the farmers required substantial amount of money

Table 4 : Utilization of Poultry house & Equipment of independent and contract farming system

	Independent Farm	Contract Farm
Average Minimum		
Birds Reared (per batch / per farm)	530	1,427
No. of Batch (per batch / per farm)	5.4	5.60
Yearly Actual		
Birds Reared (All batch / per farm)	5,037	9,179
Average Maximum		
Birds Reared (per batch / per farm)	1,361	1,835
Yearly Potential		
Maximum Birds Reared (All batch / per farm)	8,239	10,466

Source : Field survey, 2003.

Note : 1) Sample size of independent and contract farms were 25 and 50, respectively.

2) 1 US \$ = 58.50 taka, 2003.

to run the poultry farms. The amount of loans obtained from both institutional and non-institutional sources is a significant determination of adaptation of the new technology. It is difficult for a farmer to manage such a large investment from their accumulated savings. As a result although broiler business is profitable but most of the farmers claim that due to higher input prices and capital constraint farmer varies to rear total number of birds per batch to batch. Not using the bird rearing capacity if we only use the farmers own maximum bird reared capacity per batch and averaged it then it was appeared that average per year birds will be 8239.28 whereas independent farmers actually reared 5037 birds (Table 4).

The Government of Bangladesh also recognizes the credit needs of the farmers. After 1990, the supply of institutional credit increased significantly due to poultry development policy. Although bank loans are available for broiler farming from different sources and farmers also willing to get bank loan for farming, but due to the weakness of the credit institutions, credit has remained concentrated in the hands of few wealthy farmers. The complicated loan-sanctioning procedures have led to untimely disbursement, which together with the spread of corruption among bank officials has promoted

laxity in credit disciplines and poor recovery.

In case of contract farming, under the terms of contracts, the contractor provides feed, day old chicks, veterinary care, technical assistance and marketing services. Farmers' are paid a fixed price per bird for raising the birds. Furthermore, they receive insurance from death bird. The feed and other inputs supplied by the contractor represent over 90% of the annual total cost of the production. That means farmers only paid 10% of annual average cost. So, it is clear that farmers can get financial support without any interest rate to run the business smoothly in this farming system from integrator. Moreover, the integrator can be assured that the credit will be spent on production because the loans are usually distributed in kind and the supervisor often monitors the use of inputs.

(ii) Risk Reduction

Risk reduction is next cited reason for entering contractual agreement. Broiler contracts lower price risk for farmers' because contract price do not depend on market price fluctuation. Contract farming system gives a guarantee of minimum price to the farmers who do not have to bear the price risk. Moreover, only this contractual agreement introduces bird insurance

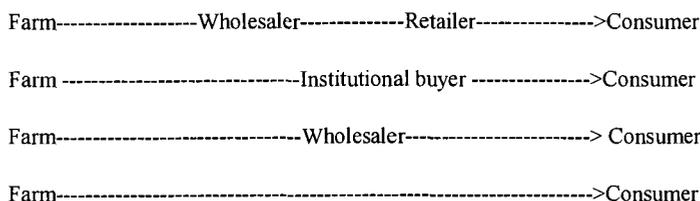


Figure 3. Different marketing channels of poultry farm to sell meat

system against mortality of bird in Bangladesh. The integrator introduced an internal insurance scheme to cover the risk of loss in case of immature death of chicks by disease and other cogent reason. For independent farmers there is no poultry insurance system in Bangladesh. Contract arrangements reduce risk by pre-determined prices and insurance scheme, so, income is more stable over time. Farmers receive a steady cash flow from contract fees and main inputs on credit, giving them a safe position from which to conduct business.

(iii) Marketing Facility

Lack of proper marketing facility is another reason for entering contract system. Marketing problem is an important problem for independent poultry farmers. In the study area the poultry farms used different channels to sell their broiler. Different marketing channels are presented in Figure 3. In the study area most of the respondents stated that sometimes they faced problem of selling broiler in time. Sometime they bound to sell at lower price because of inadequate transporting facility to transport and market their products in different towns and cities. Due to this problem farmers have to sell their products to local buyer and often do not get appropriate return. But by entering into contractual agreement, the grower can guarantee that ABFL will buy the grown up chicken. So, this reason also motivated farmer to enter contract farming system.

(iv) Technical Knowledge

Broiler farmers should have technical knowledge to run a poultry farm but most of the poultry farmers started this business without being proper trained. Facilities to train up poultry farmers on various aspects of poultry farming are inadequate in the country. They are in many cases not in touch with modern technology to augment production. Inadequate knowledge about poultry diets are the major problem, most of the independent broiler farm owners reported that they do not have sufficient knowledge about poultry diets. To get technical know how some farmer decided to enter contract farming. By entering contract farm productivity increases to the extent that management decisions are transferred to the contractor, producers can benefit from technical advice and market knowledge, which not otherwise available.

6. Comparison between Vertically Integrated Contract and Independent Poultry Farms

(i) Comparison of Net Return

An attempt is made to determine the comparative net return gain from contract broiler farming system and independent farming system. In this study, cost items consisted of feed, hired labor, vaccine and medicine, transportation, litter, equipment and machinery, housing, land use cost, interest on operating capital and miscellaneous. On the revenue side, gross return, net return, rate of return were determined and analyzed in this study.

Broiler production input costs are high and small farmers receive advances from the firm

Table 5 : Comparative Annual Average Cost, Return and Profit of Independent and Contract broiler farms

Particulars	independent farm		Contract farm	
	(taka / farm)	%	(taka / farm)	%
Total variable cost				
DOC	96,757.76	27.6	139,034.60	28.7
Feed	195,350.40	55.8	272,058.90	56.2
Vaccine & medicine	14,054.84	4.0	21,847.66	4.5
Electricity	4,342.50	1.2	14,392.00	3.0
Pollythyne	1,324.00	0.4	1,146.60	0.2
Trans cost	1,867.00	0.5	11,892.00	2.5
Litter cost	5,918.80	1.7	4,352.20	0.9
Miscellaneous	120.00	0.0	725.04	0.1
Hired Labor	7,788.00	2.2	5,474.00	1.1
Family labor	6,275.50	1.8	11,660.00	2.4
Int. on OP capital	16,376.21	4.7	1,899.11	0.4
Sub Total	350,176.00	96.1	484,482.11	98.1
Total Fixed cost				
Dep on equip	1,374.39	9.6	1,772.63	19.1
Dep on housing	7,858.69	55.1	5,042.71	54.3
Land rent	5,020.40	35.2	2,477.27	26.7
Sub Total	14,253.00	3.9	9,292.61	1.9
Total Cost	364,429.00	100.0	493,774.72	100.0
Total Cash Returns				
Broiler sold	398,525.70	97.5	624,380.34	96.7
Faces sold	3,664.80	0.9	2,306.00	0.4
Feed bag sold	2,010.96	0.5	2,821.35	0.4
Insurance	N.A.		16,163.33	2.6
Sub Total	404,201.46	98.9	645,671.02	100.0
Home consumed	2,566.61	1.1	N.A.	N.A.
Total Returns	406,768.07	100.0	645,671.02	100.0
Gross margin	56,592.00		161,188.00	
Net return	42,338.00		151,896.00	
Rate of Return	0.12		0.31	
	(0.21)		(0.21)	

Source : Field survey, 2003.

Note : 1) Sample size of independent and contract farms were 25 and 50, respectively.

2) 1 US \$ = 58.50 taka, 2003.

3) Average bird / year and average batch per year of independent and contract farm were 5037, 9179, 5.5 and 5.6, respectively.

4) Home consumption is expressed by opportunity cost.

5) Gross margin and Net return are calculated by deducting Total variable cost and Total cost from Total return, respectively. Rate of return is calculated by dividing Net return to Total cost.

6) The figures in parentheses indicate coefficient of variation.

7) N.A. = Not Applicable.

for feed, day old chicks and vaccine and medicine by kind to overcome potential credit constraints. Most of the farmers are credit constrained and hence do not have financial access to run poultry business smoothly. Contracts

eliminate much of the need for growers to obtain production credit because the contractor provides most of the inputs. It means integrator provides major share of total cost. For total costs, expenses were also classified into variable

and fixed items. Under variable costs, feed, day old chick and medicine/vaccines were the major expenditures, accounting for 56, 28 and 4 percent, respectively. Variable costs were the major costs (96–98%) of the total cost (Table 5). This was indicative of the high operating capital investment required in the broiler business. It is also evident from Table 5 that in case of contract farmer, 100 percent of the average total returns were contributed by the total cash income. This was attributed to their contract with the integrators, under which the latter was to take all the broilers produced. Under this arrangement, however only those birds meeting the basic live weight were given the premium price. ABFL fixed prices before contract and farmers got the price on basis of that, in the survey period average price and average bird per year were 54 tk per kg and 9179. Total cash returns per farm from contract growing averaged 645,671 taka (Table 5).

Total value of fixed costs per farm was tk 9,293 while variable costs were tk 484,482. The total costs per farm for contract growing amounted to tk 493,775 resulting in a net return tk 151,896 per farm. For the independent grower 98 percent of total cash returns came from the sales of broilers, which almost to tk

404,201. Home consumed reported tk 2567 by the sample independent grower where as contract grower was zero. On a per farm basis, the total fixed of the independent grower was tk 14,253 while it was tk 350,176 for variable cost. In the study period average price received by independent farmer was 63 tk per kg. In case of independent farm the number of birds varies from batch to batch, the average birds per year were 5037. Therefore, the independent grower incurred tk 364,429 total cost and obtained a net farm return of tk 42,338.

However, in the final analysis, the contract farmers were still better off in their net income since the major cash inputs were provided by the integrators and had a guaranteed market. It is evident from the table 5 that net return of contract farm is more than 3.6 times higher than the net return of independent farm. Rate of return also indicates that contract farm is more profitable than independent farm.

Part of the profit gains from contracting might be explained by difference in access of equipment, if contract growers are able to obtain more financing because they face less risk then they could more easily adopt newer and more productive equipment than independent growers which may increase farm production.

Table 6 : Average Capital Investment on Equipment of sample Independent and Contract Farm

	Independent Farm	%	Contract Farm	%
Tools & equipment				
Brooder	N.U.	N.U.	840	8
Drinkers	651	7	1,078	10
Feeder	964	10	1,327	13
Chick guard	302	3	674	6
Lamp	615	7	1,424	14
Fan	6,761	73	3,077	29
Generator	N.U.	N.U.	2,096	20
Average Capital investment	9,293	100	10,516	100

Source : Field survey, 2003.

Note : 1) Sample size of independent and contract farms were 25 and 50, respectively.

2) 1 US \$ =58.50 taka, 2003.

3) Average bird/year and average batch per year of independent and contract farm were 5037, 9179, 5.5 and 5.6, respectively.

4) N.U. means Not Using.

Table 7 : Comparative Feed and labor productivity of Independent and Contract broiler farms

Particulars	Independent Farm	Contract Farm
	Mean	Mean
Feed productivity (cwt.broiler/cwt.feed)	0.47	0.59
Labor productivity (cwt. broiler /labor hour)	3.09	3.57

Source : Field survey, 2003.

Note : 1) Sample size of independent and contract farms were 25 and 50, respectively.

2) 1 US \$ =58.50 taka, 2003.

3) Average bird / year and average batch per year of independent and contract farm were 5037, 9179, 5.5 and 5.6, respectively.

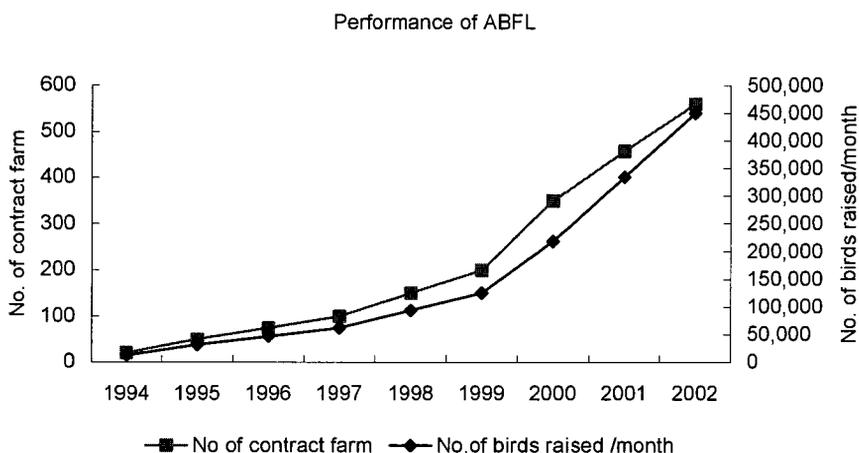


Figure 4. Performance of ABFL from 1994 to 2000

Table 6 shown that contract growers have more farm equipment such as brooder, chick guard etc. Brooder and chick guard provide necessary heat to baby chicks which may increase bird's proper growth.

In many cases farmers are not in touch with modern technology to augment production. Inadequate knowledge about poultry diets are the major problem, most of the independent broiler farm owners reported that they do not have sufficient knowledge about broiler diets. Ratio of feed varies from starter, grower and finisher of broiler production. In case of contract farm, farmers receive assistance and technical advice from the company appointed supervisor on regular basis, which lead higher productivity by proper feed formulation and medication and vaccination. From Table 7 it is evident that average feed productivity and labor productivity

of contract farm is higher than that of the independent farm. Such productivity also increases the income of contract farm.

The number of contract broiler farms and number of birds raised per month from 1994 to 2002 is shown in figure 4. According to the figure it seemed that the people of that locality started taking interest in contract poultry farming by knowing its profitability. The producers in the contract system attain the highest gross margins as well as net return of two systems. Producer clearly favors the vertical integrated contract system as it has the highest gross margins, net return and rate of return of two systems. The summary results indicate that vertically integrated contract farm is more profitable compared to independent farm.

Table 8 : Use of Labor in Poultry Production in Independent and Contract Farming System

Types of Labor	Types of Farm		Difference
	Independent Farm (M-days)	Contract Fram (M-days)	
Family Labor	89.65	194.49	117%
Hired Labor	228.6	310.36	36%
Total Labor	318.25	504.85	59%

Source : Field survey, 2003.

Note : 1) Sample size of independent and contract farms were 25 and 50, respectively.

2) 1 Man-day = 8 hours.

(ii) Comparison of Labor Utilization

The survey also collected information of the labor use for poultry production activity. Table 8 presents the labor use information for independent and contract poultry farm. The total use of labor in the poultry farming activity in the contract farm was about 59% higher than in independent farm. Most of the increase, however, was on account of family labor.

Furthermore, the broiler industry generated jobs within the industry, in terms of production (i.e., hatcheries, breeder farms, broiler farms, corn, soybean farms) processing (i.e., feed mills, dressing, processing, cold storage) marketing (including veterinary and extension services) and consumption (e.g. fast-food outlets, restaurants). Jobs were also created at the farm level by using family labor.

(iii) Comparison of Farm Risk

A farmer's decision to enter a contract and his or her successful participation in it will lead to increase revenue and reducing risk exposure. Risk is an important factor in broiler production. Price risk is one important contributor to income variability. In case of price risk, broilers are perishable, if farmer failed to sell at proper time, they will face a great loss. So, the biological nature of broiler is the cause of price instability. Broiler is sensitive agricultural product. It can not be stored for long time without proper storage facilities. For this reason, the producer wants to sell their products immediately. Prices observed in time are the results of seasonal pattern of change. Measuring seasonal variation is required to know the short time fluctuation in the time series data. In Bangladesh still now people buy whole live chicken rather than

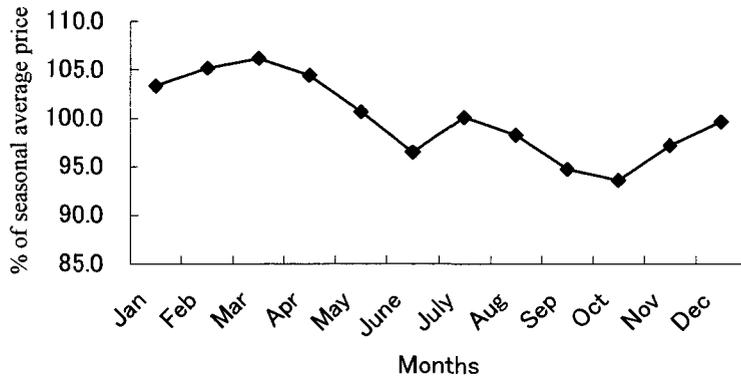


Figure 5. Poultry seasonal price variation in Dhaka Market, 1992-2000
 Souce : Various Issues of Statistical yearbooks ([6], [7], [8], [9])
 Note : Price Unit (one unit=1.5- 2 kg)

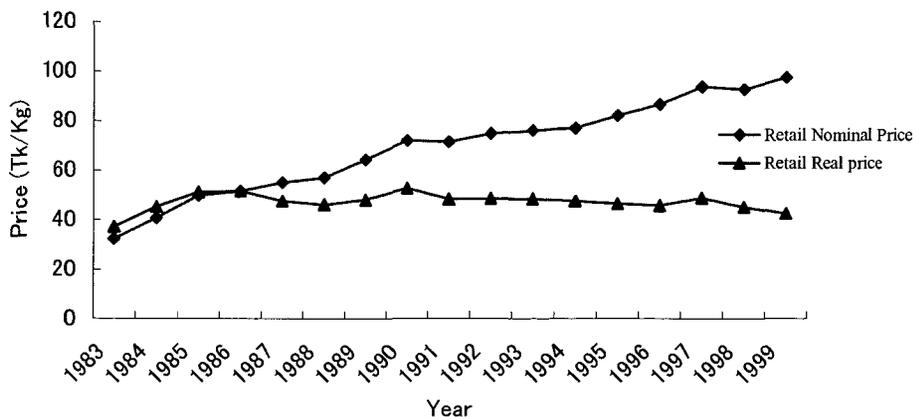


Figure 6 . Retail Price of Chicken from 1983–1999

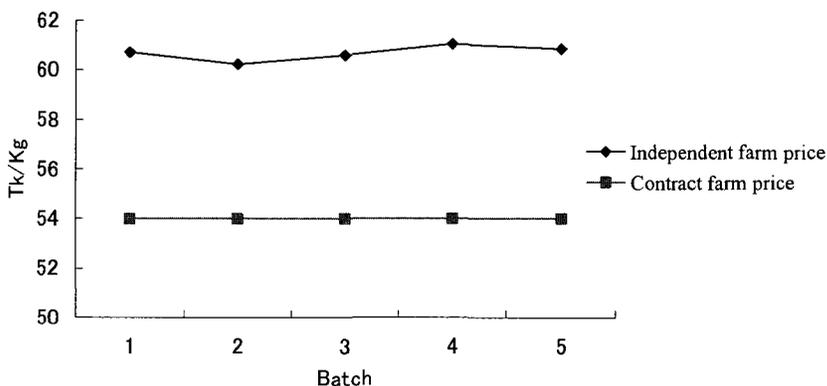


Figure 7 . Batch to batch Variation of Independent farm

Source : Field suevey, 2003.

Note : Sample size and average batch per year of independent and contract farms were 25, 50, 5. 5 and 5. 6, respectively.

packed chicken. That's why average monthly wholesale price of big size (1.5 to 2 kg) poultry in dhaka markets used to measure seasonal price variation. Data were collected from the Directory of Agricultural marketing (DAM). Data covered the period from january 1992 to december 2000.

The ratio-to-moving average method was used in this study to measure seasonal variations. Figure 5 depicts the seasonal indices. Poultry price in March is 106 per cent of those of the average month, typical October price is 93 per cent of those of the average month, and so on. Ramadan, Eid-ul-fitar, Eid-ul-Azha begins with the first appearance of the new moon in

the month of nine, ten, and twelveth, respectively of the lunar calendar. Most of the festival like Ramadan, Eid-ul-fitar, Eid-ul Azha, picnic and marriages etc. happened in winter season from 1992 to 2000, which created high price in those months (November-March) and thus causing seasonal fluctuation in price. From figure 6 it was also observed that the price declined from April to October. The reasons of decline price on those months for poultry were the high availability of fish in rainy season, flood and hot weather.

Figure 6 shows the nominal retail prices and real retail poultry prices. Nominal retail price is increasing from year to year but real retail

Table 9 : Average Annual Return per farm from Bird Insurance

Particulars	Independent farm	Contract farm
cost for insurance	N.A.	13,769
Return from Insurance (tk / farm)		16,163
a) Return from Refund (less than 3 % mortality rate) tk / farm		4,833
b) Return from Refund (4 - 6 % mortality rate) tk / farm		1,018
c) Return from Refund (7 -10% mortality rate) tk / farm		387
d) Return from Refund (11-15% mortality rate) tk / farm		106
e) Return from Claim (above 15% mortality rate) tk / farm		9,819

Source : Field survey, 2003.

Note : 1) Sample size of independent and contract farms were 25 and 50, respectively.

2) 1 US \$ =58.50 taka, 2003.

3) Average bird / year and average batch per year of independent and contract farm were 5037, 9179, 5.5 and 5.6, respectively.

4) Average mortality rate per year of independent and contract farm were 5.6 and 7.3, respectively.

5) N.A. means Not Applicable.

prices have remained relatively stable since 1991 to 1997, after that 1998 it decline because of the worst flood of 1998 in Bangladesh. In the study period independent farm received price of broiler 56–70 tk per kg, whereas contract farmer get 54 tk per kg. Figure 7 shows the batch to batch variation of poultry price received by the independent farmer in the year 2002. A telling factor was that contract farmers were not much affected by fluctuating prices since the price agreed upon at contract signing was fixed, regardless of market price changes. As a result, growers payment depend upon production outcomes but not price outcomes. So, growers do not bear price risk. Besides that most of the independent respondents stated that sometimes they faced problem of selling broiler in time which affect their selling price. In the study area the poultry farms used different channels to sell their broiler as already presented in Figure 3.

Production risk is another contributor for income variability. Production risk mainly happened in broiler farming due to death loss of bird. Outbreak of disease is causing a considerable economic loss and erosion of confidence in poultry farming. The major poultry diseases that the farmer faced in the study area were (a) Fowl cholera, (b) Gumboro disease, (c) Fowl pox,

(d) New castle diseases etc. Gumboro and New Castle disease affect in epidemic form and large quantity of losses occurred. Contract growers were freed from the dreaded pests and diseases or epidemics since the integrator provided technical assistance and insurance. ABFL is the only farm in Bangladesh which introduced an internal insurance scheme to cover the risk of loss and safeguard the interest of the contract growing farmers in case of immature death of chicks by diseases and other cogent reasons. According to this scheme, ABFL operates a contributory security fund. Farmers contribute taka 1.50 per chick to the fund. If the mortality is less than 3 percent, 4 – 6 percent, 7 – 10 percent and 11–15 percent then 80, 40, 20, 10 percent of the contribution made by farmer is refunded, respectively. If the mortality rate is above 15 per cent, then farmer can claim for insurance money, taka 20 per bird is paid after deducting 15 percent of the mortality quantity from the total mortality quantity within the period up to 20 days. After 20 days taka 30 per bird is given to farmer after calculating the benefits of 20 days age as stated earlier. Because of this measure, farmers feel secured and are encouraged to take up this venture. Return came from the insurance averaged 16,163 taka (Table 9) per farm.

Independent farm's producer purchased one day old chicks from the nearby hatchery of study area, such as Phoenix, Paragon, Kazi, etc. In the independent farm different types of strain were found. Most of the farmer chose the strain of 'Hubbard', because of less mortality, and high disease resistance, etc. Less mortality means that the ratio of number of death chicks to live chick could be lower. Farmer also choose Vancobb, Starbro, Casila, Hi-sex, Ross, because of good performance of the chick for growth and body weight. Contract farmer bound to choose one out of three strain, those were I-757, MPK and Arbor-Acres. The average day old chick price of independent and contract farm were 24.5 and 18 tk, respectively. Price of day old chick may vary strain to strain.

The vast majority of farmers are risk averse, i. e., when choosing between two production investments they will choose the less revenue risky of the two. Coefficient of Variation (C.V) helps to choose between two production investments where one has both a higher expected return and higher standard deviation than the other, measure risk per unit of return. Coefficient of Variation is calculated by dividing the standard deviation by expected return. The rate of return is calculated net return (amount received—amount invested) divided by amount invested at that year. Table 5 also depicts that Coefficient of variation of rate of return of both farm is same but average rate of return of contract farm is higher than that of independent farm. Therefore, producer clearly favors the vertically integrated contract system.

So, the spectacular conclusion that could be drawn from the result is that farmers of contract farming has less revenue risk, that's why a risk averse farmer would choose investment in contract farming because the risk per unit of return is lower than the risk per unit of return of independent farm.

6. Conclusion

The results suggested that contract farming system is substantially more profitable compared to independent farming system. Net return of vertically integrated contract farming system was much higher compared to independent farming system in broiler production. The higher profitability that results from contracting may be due to financial support, technical information exchange and marketing assistance. This technical information exchange may involve know how concerning feed mixtures or feed timing that results higher feed and labor productivity. In addition, goods and services provided by the contractor such as veterinary care, feed and chicks may be superior to that available to an independent farmer, resulting in greater weight gain. Moreover, the study has found vertically integrated contract farming system is a lower risky system compared to independent farming. In contract farming system price risk and part of production risk due to mortality was shared by integrator. Mortalities or losses incurred during disease outbreaks were shared between contract farmers and integrators by insurance policy. Moreover, Contract farmers were also assured of more stabilized prices even during period of low demand. So, it could be concluded that well organized vertically integrated poultry farming could be a feasible approach to increase the poultry production in Bangladesh and by following this system various problem of running commercial farms will be solved as well as contract poultry farmers will be more benefited than independent farmer. It could be suggested that for increasing the poultry production and developing poultry industry, government as well as other private integrators can take initiative to establish such effective and well organized contract farming system in Bangladesh.

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