Agricultural Economics Research Review
Vol. 23 July-December 2010 pp 315-324

Broiler Production in Punjab — An Economic Analysis§

Varinder Pal Singh, V. K. Sharma, M.S. Sidhu and H.S. Kingra
Department of Economics and Sociology, Punjab Agricultural University, Ludhiana - 141 004, Punjab

Abstract

The cost and return analysis of different sizes of broiler farms in the Punjab state has been carried out based on the primary data collected from 140 broiler farmers for the period March 2008 to February 2009 in three districts, viz. Ludhiana, Hoshiarpur and Muktsar. The study has shown that the total fixed investments per bird have been highest on small farms, followed by medium and large farms. The total variable cost per bird has been reported highest on small farms, followed by medium and large farms. The total cost of meat production per bird has been found highest on small broiler farms, followed by medium and large farms. The net returns per bird over the variable costs have been recorded highest on large farms and economies of scale prevail on these farms. The meat-feed price ratio and benefit-cost ratio have been found to increase with increase in farm-size of broiler farms, which indicates better utilization of inputs on large farms. On the basis of net present value, benefit-cost ratio and internal rate of return, investment in broiler farming has been found profitable in all farm-sizes, it being most profitable on large farms, followed by medium and small farms. The small broiler farms have been observed highly sensitive to increase in costs and decrease in net returns. The study has observed that broiler farming is a profitable venture and has a bright future in the Punjab agriculture for improving economic status of the farming community

Introduction

Broiler industry is one of the profitable agro-industries which can effectively tackle the problems of unemployment and underemployment in the rural areas, particularly of small and marginal farmers. Broiler industry can be adopted under a wide range of climatic conditions and can generally be combined conveniently with other farm enterprises. The land and capital requirements for this enterprise being not large, it ensures a regular flow of income through the marketing of poultry products. In spite of a spectacular growth in the poultry sector during the past two decades, a huge gap exists between availability and requirement of poultry products. An increase in per capita consumption by one egg and 50 grams of poultry meat can create employment for about 26,000 persons per year (Kazi, 2003). The present per capita availability of poultry meat is 1.8 kg against the requirement of 11 kg, as per the National Committee on Human Nutrition in India (www.indiastat.com, 2006). Therefore, to meet the domestic requirement, there is a need of about six-times increase in meat production. Increase in population growth, changing life-style, shifting of food habits, rapid urbanization, increased per capita income, awareness about health care, etc. are contributing towards rising demand of poultry products. Thus, the growth potential of this sector is bright due to regular flow of income throughout the year in the rural economy of the Punjab state. In India, the production of broilers increased from 1.89 lakh tonnes in 1985-86 to 23.13 lakh tonnes in 2006-07, at a compound annual growth rate of 13.21 per cent. In broiler production, India stands 5th in the world with 2.31 million tonnes of broiler meat, contributing Rs 9000 crore to the national economy (Yadav and Kumar, 2008).

Poultry farming assumes special significance in the state of Punjab due to land fragmentation in the rural areas. The productivity and production of food grains,

* Author for correspondence,
Email: mssidhu_pau@yahoo.co.in

§ Paper is based on Ph.D. dissertation of the first author completed under the supervision of the second author and approved by Punjab Agricultural University, Ludhiana, Punjab.

particularly of cereals in Punjab have already reached a point of saturation with little scope to increase, resulting in looking for subsidiary occupations like poultry farming. At the same time, due to limited scope of further addition to the net area sown and huge indebtedness, viz. 89 per cent farmers indebted with Rs 50140/ha (Singh *et al.,* 2008), diversification of agriculture through allied activities like poultry farming has acquired added significance for solving the agrarian crisis of the state. Adoption of poultry farming (broilers), especially by marginal and small farmers, will not only liberate them from the debt trap but would also meet the growing demand of poultry meat. Therefore, the present study was undertaken to look into the investment pattern, costs and returns structure, production efficiency and economic viability of different sized poultry farms in the state of Punjab.

Materials and Methods

The study was conducted in three districts, viz. Ludhiana (with maximum intensity of birds), Hoshiarpur (with intermediate intensity of birds) and Muktsar (with lowest intensity of birds) of the state of Punjab. Three-stage random sampling technique with district as first, block as second, and the ultimate respondents as third stage sampling unit was adopted. Further, three blocks were selected randomly from each selected district and then all broiler farms from these districts were classified into three categories using cumulative cube root frequency method, viz. small (up to 2000), medium (2001 to 4800) and large (above 4800). A sample of 140 broiler farmers of different sizes was selected by probability proportional to size method. The primary data were collected by personal interview method for five batches of broilers from March 2008 to February 2009.

The depreciation was charged on the value of buildings as 5 per cent per annum and on equipments as 10 per cent per annum. The interest on fixed capital was charged @ 12 per cent per annum. The stock of poultry birds is an asset, but it was not considered as fixed capital as the size of the flock undergoes a rapid change. Interest on investment on poultry birds was charged @12 per cent per annum. The term working capital included investment on feed, labour, medicines and miscellaneous costs. The interest on working capital was charged @12 per cent per annum for the half the accounting period. For analysis, simple averages and percentages were used. For studying the financial viability of poultry enterprise, net present value, benefit-cost ratio and internal rate of return were calculated using standard procedures.

Results and Discussion

Fixed Capital Investment Pattern on Different Broiler Farm-sizes

The pattern of fixed capital investment for different broiler farm-sizes has been presented in Table 1. It is revealed that total fixed investment was maximum on large farms (Rs 1326346), followed by medium (Rs 578516) and small farmers (Rs 268854) with the overall average of Rs 678083. The investments on buildings were to the tune of Rs 1245829 (93.93%), Rs 548867 (94.87%) and Rs 255528 (95.04%) on large, medium and small broiler farms, respectively with the overall average of Rs 639832 (94.36%). The broiler sheds were the main item of costs in buildings. Further, the investments on equipments were to the tune of Rs 80517 (6.07%), Rs 29649 (5.13%) and Rs 13326 (4.96%) on large, medium and small broiler farms, respectively with the overall average of Rs 38251 (5.64%). Among equipments, feeders plus waterers were the main components of investment.

Variable Cost on Different Broiler Farm-sizes

The various items of variable costs on different broiler farm-sizes have been presented in Table 2. A perusal of the table brought out that the total variable cost was Rs 556600, Rs 1121086 and Rs 2838717 on small, medium and large farms, respectively with the overall average of Rs 1406376. The major items of variable costs were feed (56.23%), followed by day-old chicks (20.56%) and miscellaneous items (7.13%). In size-wise analysis, the cost of feed was found to be Rs 311636 (55.99%), Rs 631765 (56.35%) and Rs 1596350 (56.23%) on small, medium and large broiler farms, respectively. Khan and Babu (2004) have reported the expenditure on feed constituted the most important item of cost among variable costs (61.81% in small and 58.30% in large farms). The cost of day-old chicks was Rs 102400 (18.40%), Rs 224836 (20.06%) and Rs 605745 (21.34%) and cost on miscellaneous items was Rs 34299 (6.16%), Rs 77289 (6.89%) and Rs 212549 (7.49%) on small, medium and large farms, respectively. The interest on working

Table 1. Fixed capital investment pattern on different broiler farm-sizes in Punjab: 2008-09

(Rs)

Sl No.	Investment item	Farm category			Overall average
		Small	Medium	Large	
		Per farm fixed investments			
A. Buildings					
i	Broiler shed	202963	456444	1110975	550357
		(75.49)	(78.90)	(83.76)	(81.17)
ii	Feed store	38019	66778	91805	63014
		(14.14)	(11.54)	(6.92)	(9.29)
iii	Office & labourer room	14546	25645	43049	26461
		(5.41)	(4.43)	(3.25)	(3.90)
	Sub-total (A)	255528	548867	1245829	639832
		(95.04)	(94.87)	(93.93)	(94.36)
B. Equipments					
i	Feeders + waterers	6654	14789	40384	19148
		(2.48)	(2.56)	(3.05)	(2.82)
ii	Feed grinder + Mixer	2540	5626	15266	7259
		(0.94)	(0.97)	(1.15)	(1.07)
iii	Miscellaneous	4132	9234	24867	11844
		(1.54)	(1.60)	(1.87)	(1.75)
	Sub-total (B)	13326	29649	80517	38251
		(4.96)	(5.13)	(6.07)	(5.64)
	Total fixed investment	268854	578516	1326346	678083
		(100.00)	(100.00)	(100.00)	(100.00)

Note: Figures within the parentheses denote percentages to total fixed investment.
Miscellaneous items include: Furnaces, water infrastructure, balance, buckets, thermometer, sprayers, daatri, khurpa, belcha, tasla, etc.

capital was to the extent 4.49 per cent, 4.39 per cent and 4.31 per cent on small, medium and large farms, respectively.

Total variable costs per bird showed a more realistic picture of the variable cost on different broiler farm-sizes. The total variable cost per bird was the highest on small farms (Rs 77.37), followed by medium (Rs 68.18) and large (Rs 62.51) farms, with the overall average of Rs 65.84. It is also evident from Figure 1 that small category farms operate on higher variable costs as compared to medium and large category farms. The variable cost relatively decreased as the farm-size increased. Similar trends were found in the case of per bird feed cost, interest on working capital, labour charges, etc. due to the existence of economies of scale on large farms. Large farms were able to purchase the inputs in bulk and at lower prices for further mixing of various feed ingredients at their own farms. The per bird feed cost was Rs 43.32, Rs 38.42 and Rs 35.15 on small, medium and large broiler farms, respectively with the overall average cost of Rs 37.02. The per bird cost of day-old chicks was highest on small farms (Rs 14.23), followed by medium (Rs 13.67) and large (Rs 13.34) broiler farms. The per bird interest on working capital was Rs 3.48, Rs 2.99 and Rs 2.69 on small, medium and large farms, respectively. Thus, it may be concluded that per bird variable cost was lower on large farms due to the existence of economies of scale in these farms.

Cost of Broiler Production on Different Farm-sizes

The total cost of broiler production has been found the highest on large farms (Rs 3068222), followed by medium (Rs 1220917) and small (602971) farms with the overall average of Rs 1523562 (Table 3). The total fixed costs were the highest on the large farms (Rs 229505), followed by medium (Rs 99831) and small

Table 2. Variable costs on different broiler farm-sizes in Punjab: 2008-09

(Rs)

Sl No.	Cost item	Farm category			Overall average
		Small	Medium	Large	
Per farm variable cost					
(i)	Day old chicks	102400	224836	605745	289162
		(18.40)	(20.06)	(21.34)	(20.56)
(ii)	Feed	311636	631765	1596350	790772
		(55.99)	(56.35)	(56.23)	(56.23)
(iii)	Labour charges	47833	57867	81585	60943
		(8.60)	(5.16)	(2.87)	(4.33)
(iv)	Medicines/vaccines	14439	32654	89698	42334
		(2.59)	(2.91)	(3.16)	(3.01)
(v)	Electricity/diesel, etc.	8691	20491	57821	26872
		(1.56)	(1.83)	(2.04)	(1.91)
(vi)	Miscellaneous items	34299	77289	212549	100319
		(6.16)	(6.89)	(7.49)	(7.13)
(vii)	Interest on working capital	25014	49204	122280	61274
		(4.49)	(4.39)	(4.31)	(4.36)
(viii)	Interest on investment on birds	12288	26980	72689	34700
		(2.21)	(2.41)	(2.56)	(2.47)
	Total variable cost	556600	1121086	2838717	1406376
Per bird variable cost					
(i)	Day old chicks	14.23	13.67	13.34	13.54
(ii)	Feed	43.32	38.42	35.15	37.02
(iii)	Labour charges	6.65	3.52	1.80	2.85
(iv)	Medicines/vaccines	2.00	1.99	1.98	1.98
(v)	Electricity/diesel, etc.	1.21	1.25	1.27	1.26
(vi)	Miscellaneous items	4.77	4.70	4.68	4.70
(vii)	Interest on working capital	3.48	2.99	2.69	2.87
(viii)	Interest on investment on birds	1.71	1.64	1.60	1.62
	Total variable cost	77.37	68.18	62.51	65.84

Note: Figures within the parentheses denote percentages to total variable cost.

Miscellaneous items include: Litter/saw dust, whitewashing, insecticides, curtains, stationary, etc.

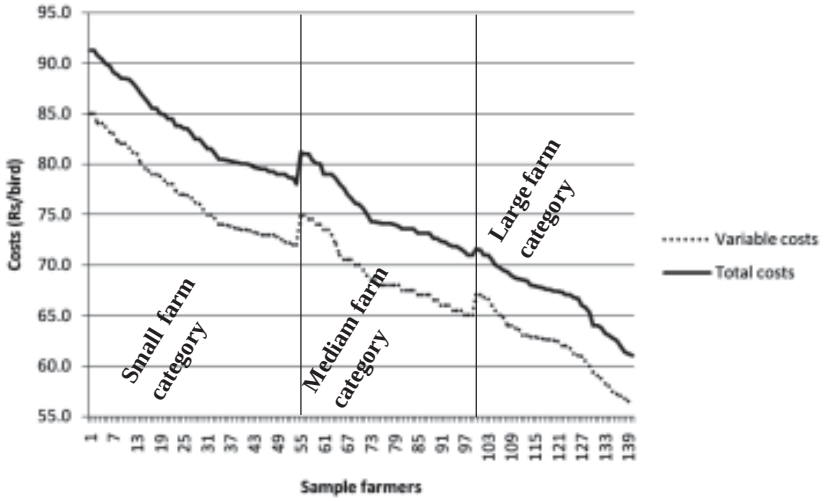

Figure 1. Variable cost and total cost among sample broiler farmers

Table 3. Total cost of broiler production on different broiler farm-sizes in Punjab: 2008-09

(Rs)

Sl No.	Cost item	Farm category			Overall average
		Small	Medium	Large	
Per farm total cost					
(i)	Depreciation on buildings	12777	27443	62291	31991
		(2.12)	(2.25)	(2.03)	(2.10)
(ii)	Depreciation on equipments	1333	2965	8052	3825
		(0.22)	(0.24)	(0.26)	(0.25)
(iii)	Interest on fixed capital	32263	69422	159162	81370
		(5.35)	(5.69)	(5.19)	(5.34)
A	Total fixed cost	46371	99831	229505	117186
		(7.69)	(8.18)	(7.48)	(7.69)
B	Variable cost	556600	1121086	2838717	1406376
		(92.31)	(91.82)	(92.52)	(92.31)
	Total cost (A+B)	602971	1220917	3068222	1523562
Per bird total cost					
(i)	Depreciation on buildings	1.77	1.67	1.37	1.50
(ii)	Depreciation on equipments	0.19	0.18	0.18	0.18
(iii)	Interest on fixed capital	4.48	4.22	3.50	3.81
A	Total fixed cost (1+2+3)	6.45	6.07	5.05	5.48
B	Variable cost	77.37	68.18	62.51	65.84
	Total cost (A+B)	83.82	74.25	67.56	71.32

(Rs 46371) farms. The share of variable costs in total costs was 92.31 per cent, 91.82 per cent and 92.52 per cent on small, medium and large farms, respectively (Singh, 2010).

The interest on fixed capital was the major component of fixed cost. It was Rs 32263 (5.35%), Rs 69422 (5.69%) and Rs 159162 (5.19%) on small, medium and large farms, respectively with the overall average of Rs 81370 (5.34%). The depreciation on buildings was the next major component of fixed costs.

The total cost of broiler production on per bird basis provided more clear picture. The total cost of broiler production per bird was highest on small broiler farms (Rs 83.82), followed by medium (Rs 74.25) and small (Rs 67.56) farms. It is also evident from Figure 1 that small farms operate on higher total costs as compared to medium and large farms. The total fixed cost relatively decreased as farm-size increased. It was highest on small farms (Rs 6.45), followed by medium (Rs 6.07) and large (Rs 5.05) farms with the overall average of Rs 5.48. Similarly, interest on fixed capital was highest on small farms, followed by medium and large farms.

Thus, it could be concluded that variable costs, total fixed costs and total cost of broiler production on per bird basis were highest on small farms, followed by medium and large farms. The total cost per bird decreased with increase in farm-size, indicating the existence of economies of scale on large farms.

Gross Returns from Different Broiler Farm-sizes

The income from various sources and the gross returns per farm and per bird on the different categories of broiler farms has been presented in Table 4. A perusal of Table 4 revealed that the gross returns per farm were highest on the large farms, followed by medium and small farms. Thus, the gross returns showed an increasing trend with increase in farm-size. The per bird gross returns showed a decreasing trend with farm-size.

The gross returns per kg of live weight were highest on large farms (Rs 59.61), followed by medium (Rs 58.92) and small (Rs 57.90) farms.

The income from broilers alone accounted for 98.06 per cent of the gross returns on overall basis. The

Table 4. Gross returns from different broiler-sizes farms in Punjab: 2008-09

(Rs)

Particulars	Farm category			Overall average
	Small	Medium	Large	
Per farm gross returns from				
Broilers	654866 (98.27)	1378491 (98.12)	3581093 (97.99)	1744426 (98.06)
Manure	5791 (0.87)	13140 (0.93)	36322 (0.10)	17094 (0.96)
Gunny bags	5744 (0.86)	13302 (0.95)	37001 (1.01)	17328 (0.97)
Gross returns	666401	1404933	3654416	1778848
Per bird gross returns from				
Broilers	91.03	83.83	78.85	81.67
Manure	0.80	0.80	0.80	0.80
Gunny bags	0.80	0.81	0.82	0.81
Gross returns	92.63	85.44	80.47	83.28
Gross returns per kg of live weight	57.90	58.92	59.61	58.25

income from broilers was highest on the large farms (Rs 3581093), followed by medium (Rs 1378491) and small (Rs 654866) farms. According to Khan and Babu (2004,) the sale of broiler alone contributed the major share (98.86% in small and 98.81% in large farms) in the total receipts. The per bird income from broilers came out to be Rs 91.03, Rs 83.83 and Rs 78.85 on the small, medium and large farms, respectively with the overall value of Rs 81.67. Thus, the income from the marketing of broilers showed a decreasing trend with farm-size.

Net Returns from Different Broiler Farm-sizes

The overall picture of the economics of broiler production on different categories of broiler farms can be viewed on per farm and per bird basis from Table 5. The net returns over variable costs were Rs 815699, Rs 283847 and Rs 109801 on large, medium and small broiler farms, respectively. According to Atibudhi (2004), broiler farms are generally reared on an average five cycles in a year. The returns from five cycles were estimated to be Rs 27183, Rs 12179 and Rs 7055, respectively for large, medium and small broiler farms. The net returns over total costs were Rs 586194, Rs 184016 and Rs 63430 on large, medium and small broiler farms, respectively. Halim *et al*. (2002) have reported that net income per bird was highest on large farms (Rs 11.71), followed by medium (Rs 9.23) and small (Rs 7.72) farms.

The per bird analysis of net returns, presented in Table 5, revealed that the net returns per bird increased with increase in the farm-size. On the large, medium and small farms, the net returns per bird over the variable cost were Rs 17.96, Rs 17.26 and Rs 15.26, respectively. The net returns per bird over total cost also showed a similar trend. The net returns per bird over the total cost were the highest on large farms (Rs 12.91), followed by medium (Rs 11.19) and small (Rs 8.82) farms. Further, net returns over variable cost and total cost per kg of live weight were found to be Rs 13.30, Rs 11.90, Rs 9.54 and Rs 9.56, Rs 7.72, Rs 5.51, respectively on large, medium and small broiler farms. The increasing trend of net income with farm-size could mainly be attributed to the economies of scale on the large farms. Another study has also reported that the average net returns per bird increased with increase in the farm-size (Shroff and Kalamkar, 2006). The average net returns were Rs 2.11/kg of live weight on small-size farms, Rs 3.25/kg on medium and Rs 3.76/kg on large farms. The average net returns per bird were Rs 4.17, Rs 6.28 and Rs 6.91 on small, medium and large farms respectively. Thus, it could be concluded that broiler farming is a more profitable venture on large scale basis.

Project Evaluation of Broiler Farming

Investment in broiler farming was evaluated as a project to study the financial viability of investments in

Table 5. Net returns from different broiler farm-sizes in Punjab: 2008-09

(Rs)

Sl No.	Particulars	Farm category			Overall average
		Small	Medium	Large	
Per farm net returns					
i	Gross returns	666401	1404933	3654416	1778848
ii	Fixed cost	46371	99831	229505	117186
iii	Variable cost	556600	1121086	2838717	1406376
iv	Total cost	602971	1220917	3068222	1523562
	Net returns over variable cost (NRvc) [i-iii]	109801	283847	815699	372471
	Net returns over total cost (NRtc) [i-iv]	63430	184016	586194	255286
Per bird net returns					
i	Gross returns	92.63	85.44	80.47	83.28
ii	Fixed cost	6.45	6.07	5.05	5.48
iii	Variable cost	77.37	68.18	62.51	65.84
iv	Total cost	83.82	74.25	67.56	71.32
	Net returns over variable cost per bird (i-iii)	15.26	17.26	17.96	17.44
	Net returns over total cost per bird (i-iv)	8.82	11.19	12.91	11.95
	Net returns over variable cost per kg of live weight	9.54	11.90	13.30	11.94
	Net returns over total cost per kg of live weight	5.51	7.72	9.56	8.19

broiler farming. The financial soundness, i.e. profitability of broiler farming as a project was examined by analyzing the cash flow during the assumed life of the investment. Payback period (PBP), net present value (NPV), benefit-cost ratio (BCR), and internal rate of return (IRR) were worked out to see the financial viability of investment in broiler farming. However, since it is difficult to generate cash flow for the entire life span of the project in the absence of observed temporal information on costs and benefits, the following assumptions were made for the financial analysis:

(i) Economic Life of the Project: It was assumed to be 20 years.

(ii) Construction Period: The construction of broiler sheds and buildings was assumed to be completed within nine months of the first year and the arrival of first batch of day-old chicks commenced in the tenth month.

(iii) Economic Life of Buildings and Equipments: The economic life of sheds and other buildings was assumed to be 20 years and that of equipments was assumed to be 10 years. Accordingly replacement of equipment has been provided for. The salvage/terminal value was assumed at 10 per cent of the capital cost in respect of both the sheds and buildings and poultry equipments.

(iv) The data related to costs and returns were assumed to be uniform and constant over the project life.

(v) Discount rate: It was taken as 12 per cent because the opportunity cost of capital i.e. rate at which capital was available was also 12 per cent.

Economic Analysis

The data on payback period, net present value, benefit-cost ratio and internal rate of returns of investments in broiler farms of different sizes in the Punjab state are given in Table 6.

Payback Period: It was found to be the highest in small broiler farms (4.24 years), followed by medium (3.14 years) and large farms (2.26 years). Thus, small broiler farms take longer time to cover up their initial investments as compared to medium and large broiler farms.

Net Present Value (NPV): It was highest among large broiler farms, followed by medium and small broiler farms, showing an increasing trend with the increase in farm-size. However, the investment on all farm-sizes turned out to be an economically paying preposition as the net present value was positive in all the farms.

Table 6. Project evaluation of different broiler farm-sizes in Punjab

(Discount rate 12% per annum)

Situation	Small farms				Medium farms				Large farms			
	PBP (years)	NPV (Rs)	BCR	IRR (%)	PBP (year)	NPV (Rs)	BCR	IRR (%)	PBP (years)	NPV (Rs)	BCR	IRR (%)
Present situation	4.24	176126	1.04	23.30	3.14	691352	1.08	29.07	2.26	2662245	1.12	33.32
Situation I	8.93	-43191	0.99	9.99	5.08	228966	1.03	18.41	3.13	1589095	1.07	29.12
Situation II	8.08	-22387	0.99	8.66	4.70	289365	1.03	20.65	3.06	1651952	1.07	29.45
Situation III	18.92	-241703	0.95	2.65	10.97	-173022	0.98	3.72	4.91	578802	1.03	19.37

PBP- Payback period, NPV- Net present value, BCR- Benefit-cost ratio, IRR- Internal rate of returns.

Situation I : Returns decreased by 5 per cent

Situation II : Costs increased by 5 per cent

Situation III : Returns decreased by 5 per cent and costs increased by 5 per centbroiler farms were found financially feasible under this situation, though medium farms were at the margin.

Benefit-Cost Ratio (BCR): It was 1.04 for small, 1.08 for medium and 1.12 for large broiler farms. Thus, the BCR increased with increase in farm-size and the large farms were economically more viable.

Internal Rate of Return (IRR): The IRR was highest on large farms (33.32%), followed by medium (29.07%) and small (23.30%) farms. Since IPR is greater than the discount rate representing the opportunity cost of capital, farms of all three sizes are financially viable.

Sensitivity Analysis

Reworking the analysis to see what happens under the circumstances of decreased net returns due to decrease in prices and increased gross costs, etc. is known as sensitivity analysis. When the returns were decreased by five per cent, the net present value on small farms became negative (-Rs 43191), benefit-cost ratio became less than one (0.99) and internal rate of return became 9.99 per cent, i.e. less than the discount rate of 12 per cent. Hence, small broiler farms became non-feasible with five per cent reduction in returns. Medium farms were still financially viable though at the margin. Large farms were financially viable under this situation also.

When the costs were increased by five per cent, net present value on small farms became negative (-Rs 22387), benefit-cost ratio became less than one (0.99) and internal rate of return became less than the discount rate of 12 per cent (8.66%). Medium and large

When the returns were decreased by five per cent and costs were increased by five per cent simultaneously, only large broiler farms remained financially viable and both small as well as medium farms became non-viable. The NPV on small farms became negative (-Rs 241703), BCR became less than one (0.95) and IRR was less than discount rate of 12 per cent (2.65%) and for medium farms, these figures were -Rs 173022, 0.98 and 3.72, respectively.

Thus, It may be concluded that investment in broiler farming is financially viable on all categories of broiler farms. But, the small broiler farms were highly sensitive to increase in costs and decrease in net returns followed by medium farms. On the basis of NPV, BCR and IRR, investment in broiler farming was found to be most profitable in large farms, followed by medium and small farms. This was due to the fact that the benefits per bird were

highest and cost of production per bird was lowest on large farms. In contrast, the benefits per bird were lowest and cost per bird was highest on small farms.

Production Efficiency on Different Broiler Farm-sizes

Feed conversion ratio, meat-feed price ratio and benefit-cost ratio on different sizes of broiler farms are presented in Table 7. Lower the value of feed conversion ratio, higher will be the production efficiency in broiler farming. It means the birds consume less amount of feed to attain a given amount of live weight. Higher the value of meat-feed price ratio as well as benefit-cost ratio, higher will be the production efficiency. A perusal of Table 7 revealed that feed

Table 7. Production efficiency on different sizes of broiler farm in Punjab: 2008-09

Sl No.	Particulars	Farm category			Overall average
		Small	Medium	Large	
i	Feed (kg/bird)	2.70	2.41	2.20	2.46
ii	Live weight per bird	1.60	1.45	1.35	1.46
iii	Feed conversion ratio (i/ii)	1.69	1.66	1.63	1.68
iv	Value of live weight (Rs/bird)	91.02	83.82	78.84	85.14
v	Value of feed (Rs/bird)	43.30	38.42	35.15	39.35
vi	Meat-feed price ratio (iv/v)	2.10	2.18	2.24	2.17
vii	Benefit-cost ratio (BCR)	1.11	1.15	1.19	1.17

conversion ratio was highest on small broiler farms (1.69), followed by medium (1.66) and large (1.63) farms with the overall average value of 1.68. Thus, feed conversion ratio declined with the size of broiler farm indicating higher efficiency on large farms. It was on the account of increase in meat production per bird and fall in feed consumption per bird. The higher meat production was due to use of superior strains of poultry birds on large farms. The use of concentrates, high energy ration and tonics help the chicks to reach their market size earlier. Efficient feed management and reduction in wastage of high energy feed helped in lowering the feed consumption per bird. This again led to the increase in feed efficiency on large broiler farms.

Meat-feed price ratio increased with increase in size of broiler farms. It was 2.10 on small, 2.18 on medium and 2.24 on large broiler farms, again indicating higher production efficiency on large farms. Meat-feed price ratio of greater than one on all sizes of broiler farms indicates that meat production is economically viable on all sizes of broiler farms, large farms being the most efficient. The higher meat-feed price ratio on large farms was due to firstly, increase in value of meat per bird and secondly, decrease in the value of feed consumed per bird. The increase in the value of meat per bird was due to higher meat production per bird and higher prices received by large farmers. Reduction in the value of feed consumed per bird was due the bulk purchases of feed ingredients, mixing at farm, discount on the purchase of medicines and concentrates.

Further, benefit-cost ratio was greater than one on all sizes of broiler farms indicating the economic viability of meat production. Benefit-cost ratio increased with increase in size of broiler farm. It was 1.11 on small, 1.15 on medium and 1.19 on large farms. These results were in conformity with those of Kumar and Rai (2006), who have reported that the feed conversion ratio decreased with increase in farm-size, while the meat-feed ratio and benefit-cost ratio increased with increase in farm-size, indicating the operation of economies of scale in the broiler farming. Thus, viewed from all angles, the production efficiency of broiler farms increased with the size due to better utilization of inputs.

Conclusions

The total fixed investments per bird have been found the highest on small farms, followed by medium and large farms. The total variable costs as well as total costs per bird have been found highest on small farms, followed by medium and large farms. The total cost of meat production per bird has been observed highest on small broiler farms, followed medium and large farms. The net returns per bird over the variable costs have been recorded the highest on large farms, followed by medium and small farms. This increasing trend of net income with the farm size could be attributed mainly to the economies of scale on the large farms. The production efficiency of broiler farms has increased with farm-size due to better utilization of inputs. On the basis of net present value, benefit-cost ratio and internal rate of return, investment in broiler farming has been found most profitable on large farms, followed by medium and small farms. The small broiler farms have been observed highly sensitive to increase in costs and decrease in net returns. Thus, in nutshell, the broiler farming is a profitable venture and has a bright future in the Punjab agriculture for improving economic status of the farming community.

References

Atibudhi, H. N. (2004) Production and marketing of broiler in the environs of Bhubaneswar city in Orissa. *Indian Journal of Agricultural Marketing,* **18** (3): 200-01.

Halim, R. A., Bhowmick, B. C. and Chiste, S. M. T. (2002) Broiler farming in Assam – Its potentiality for income and employment generation. *Agricultural Situation in India*, **59** (6): 351-56.

Kazi, S. S. (2003) Poultry industry, wheeling on fast lane. *Agriculture Today*, **6** (5): 45-48.

Khan, H. S. S. and Babu, K. S. (2004) Cost and returns in broiler production — A case study of Bellary district. *Indian Journal of Agricultural Marketing*, **18** (3): 191.

Kumar, B. G. and Rai, R. B. (2006) Economic status of poultry farming enterprises in Andaman and Nicobar Islands. *Agricultural Economics Research Review*, **19** (2): 377-86.

Shroff, S. and Kalamkar, S. S. (2006) Economics of broiler farming in Maharashtra. *Productivity*, **47** (1-2): 155-63.

Singh, S., Kaur, M. and Kingra, H. S. (2008) Indebtedness among farmers in Punjab. *Economic & Political Weekly*, **43** (26): 130-36.

Singh, V. P. (2010) Poultry farming in Punjab: An economic evaluation and export competitiveness. *Ph.D. Dissertation* (Unpublished), Punjab Agricultural University, Ludhiana, pp. 1-115.

Yadav, M. P. and Kumar, D. (2008) Poultry: Technically the most advanced sector. *The Hindu Survey of Indian Agriculture*, *The Hindu*, Chennai, pp. 93-95.

www.indiastat.com, 2006