ECONOMICS OF RED MEAT PRODUCTION IN PUNJAB

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ABSTRACT:- This paper analyzes the cost and return estimates of red meat among different meat production systems namely subsistence rural farms, small sized specialized farm and commercial farms. Four districts of Punjab (Gujranwala and Sialkot from rice-wheat zone and Chiniot and Faisalabad from mixed cropping zone) were selected for data collection and 76 red meat producers were interviewed. The results showed that commercial farms were dominated by cows while the small sized specialized farms were dominated by buffaloes. The mean age, sale price and live weight of sold buffaloes was 2.8 years, Rs. 64963.8 and 157 kg, respectively whereas for cows the mean age was 3 years with average sale price of Rs. 65722.1 per cow and live weight of 210 kg. The cost of production of meat animals (buffaloes and cows) was higher in commercial farms (Rs. 67820.2 and Rs. 62773.5, respectively). However, production cost incurred by small sized specialized farms was about Rs. 62856.2 for buffaloes and Rs. 49619.3 for cows. The cost of production of subsistence rural farms was Rs. 41949 and Rs. 40872 for buffaloes and cows, respectively. Net margins were higher in commercial farms i.e., Rs. 19726.5 and Rs. 10513.1 for cows and buffaloes, respectively. However the net margins received by small size specialized farms for cows and buffaloes were Rs. 13796.9 and Rs. 7743.8, respectively followed by net margins of Rs. 10377.7 and Rs. 4009, received by subsistence rural farm for cows and buffaloes, respectively.

INTRODUCTION

In Pakistan, red meat production systems are based on traditional management practices and are inefficient. Sacrificial occasion market is the only factor of success in traditional fattening systems. For the last 6 years, annual growth estimates of meat production shows increasing trends. The total annual meat production increased from 2515000t to 3232000t showing overall 4.8% annual growth during 2006-12. The highest growth has been recorded in poultry meat (10.5%), followed by beef (3.7%) and mutton (2.3%) (GoP, 2006 and 2012).

The meat demand and supply gap in Pakistan grows at 4.1% per annum (PBIT, 2011). Pakistan has a natural advantage to compete in the world meat market. Pakistani meat has a unique taste due to which it is being exported to many countries predominantly Middle Eastern countries including Saudi Arabia, Kuwait, UAE, Oman, Qatar, Bharain and some others (Ayyub et al., 2011). Despite of huge potential, Pakistan

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has not been able to exploit its large livestock population to become a major part in the international meat market (Anonymous, 2006). In future, the demand for livestock products is expected to increase at quite higher rates induced by various factors like population growth, increasing protein and calcium requirements on health grounds and more than unit income elasticity demand for meat and milk (Farooq et al., 1999; Sharif and Farooq, 2004). According to Delgado et al. (2001) the consumption of meat is thrice in developing countries during 1970-1990 as compared to developed world and it grew at an even faster rate in the second half of this period with Asia in the lead.

The establishment of fattening enterprise for livestock animals is the better option for profitable meat production systems. The socio-economic characteristics such as age, education, farming experience and farm size of farmers rearing meat animals have strong significance for the economic efficiency of these enterprises. In different studies of meat fattening enterprises average age and education of the meat animal rearing farmers were recorded about 40-50 years and 6-7 years, respectively. Animal fattening is less laborious than any other crop management activities. Perdana (2003); Umar et al. (2008) and Sarma and Ahmed (2011) concluded that the small scale enterprises for the rearing and fattening of beef animals is economically efficient and profitable business for the farmers in rural areas. Hence, they have positive financial incentives to continue or to expand production. The common practice of rearing livestock animals

and herd structure in most part of Pakistan comprise more buffaloes than cows, goats and sheep (Khan and Usmani, 2005). As far as the cost of animal fattening is concerned, the main cost incurred by the farmer is feeding cost which is about 60-80% of total production costs. Feed cost being the primary cost of animal fattening have the strongest implications on the economic efficiency of farm/enterprise. To make the animal fattening business more profitable it is necessary for the herder to formulate balanced and economical feed for animals (Urge and Tsegaw, 2008).

The lack of commercial animal fattening practices to rare meat animals, the increasing demand and supply gaps for meat, increasing domestic prices and growth in per capita income has strong impacts on the meat industry in Pakistan. There is a need to examine the economics of meat production in Punjab to provide policy recommendation based on cost and return estimates, and to evaluate the economic feasibility of rearing meat animals for farmers. This paper aimed to analyze the economics of meat production and to estimate the cost and returns from the meat animals across different meat production systems including subsistence rural, small sized specialized and commercial farms.

MATERIALS AND METHOD

The study consisted of livestock farming community from rice-wheat and mixed cropping system of the Punjab. Three types of farms were selected i.e., subsistence rural farms, small sized specialized farms and commercial farms. Subsistence

farmers are usually small farmers that sale the offspring of their milking animals for meat purpose while small sized specialized farms keep the offspring of their own stock as well as purchase and rear for meat purposes. Commercial farms are more specialized in fattening of red meat animals on large scale. Overall, four districts of Punjab (Gujranwala and Sialkot from rice-wheat zone and Chiniot and Faisalabad from mixed cropping zone) were selected for data collection. A comprehensive, well-structured and pre-tested questionnaire was used for the data collection of the 76 meat producers who were personally interviewed. Purposive and convenient sampling technique was employed to select the sample respondents.

Data Analysis

For the statistical analysis of the data obtained from the survey, different techniques of measurement were applied. The data analysis was performed by using Statistical Package for Social Sciences (SPSS version 17). The demographic and socio-economic variables in categorical form were analyzed in this part through descriptive analysis. The cost estimates were done by computing different costs of meat production reported by the farmers such as labor cost, fodder cost, concentrate feeding cost and veterinary cost.

Different cost estimations were done to find the total cost of meat production. For the calculation of labour cost; labor was categorized as family labour, permanent hired labour and casual hired labour. For family labour; opportunity cost of family labour was taken as equal to the wage of a permanent hired labour while for a permanent hired labour; the actual payment in cash and commodity was taken. For casual hired labour; its cost was allocated to those animals for which it was used. Actual amount spent in purchasing green and dry fodder was taken as fodder cost if farmers purchased from the local fodder market. For use of owned farm produced green and dry fodder the opportunity cost was calculated on the basis of local market price of these products. Concentrate feeding cost was calculated by adding the value of different concentrates given to the animals such as oil seed cake, *choker* and *vanda*, wheat and maize grains, *gur*, spices and salts, oil and ghee. Miscellaneous cost include veterinary consultant fee, vaccination cost, deworming cost and other management costs incurred per animal reported by the farmers.

The revenue was calculated by taking the sale price of each animal as reported by the respondents. The net profit margins were calculated by subtracting the total cost of meat production from the total revenue obtained by selling the animals by using the following formula:

$$Npm = TR - TC$$

where,

Npm = Net profit margins
TR = Total revenue earned by the meat producer
TC = Total costs incurred by the producer for meat production

In variation analysis, F-test technique was used to test if there was a difference between average age of sale animal, weight and sale price across three production system. The

P value was calculated using following formula:

$$F = S^2_a / S^2_b$$

where,

S^2_a and S^2_b = Variance of the first and second group, respectively.

RESULTS AND DISCUSSION

Socioeconomic Profile of Livestock Holders

The average age of the respondents was about 50 years that belonged to middle age group. The average age of commercial farms was slightly lower as compared to rural subsistence and small size specialized farmers. The level of farmers' education in the study area was low (7 years of regular schooling). Commercial farmers were more educated with 12 years of schooling as compared with subsistence rural farmers and small size specialized farms. The average livestock rearing experience was higher (28.2 years) for both rural subsistence and small size specialized farmers as compared to commercialize farmers having 15 years livestock rearing experience. Sarma and Ahmed (2011) also have the same findings that the cattle fattening was usually done by experienced dairy farmers having on average 13 years of experience. Average family size was 9.42. It was higher in small size specialized farms (11.94) than subsistence rural and commercial farms. The operational land holding was on average 20 acres, highest in small size specialized farm (40.86 acres) followed by subsistence rural farm (15.60 acres) while respondents of commercial farm owned the least land (Table 1).

Labour Status in Livestock Management Activities

Regarding labour distribution in different meat production systems, it was observed that commercial farm employed more labour (1.0) in management of animals as compared to subsistence rural farm and small

Table 1. Socioeconomic characteristics (average) of sample respondents

Socioeconomic characteristics	Subsistence rural farm	Small size specialized farm	Commercial farm	Overall
Age (year)	50.35 (13.6)	50.31 (16.3)	45.60 (9.3)	50.03 (13.9)
Formal education (years)	6.69 (4.5)	7.75 (5.1)	12.40 (2.6)	7.29 (4.7)
Livestock rearing experience (years)	29.07 (16.3)	29.50 (18.1)	15.00 (12.7)	28.24 (16.7)
Family size (No.)	8 .96 (4.8)	11.94 (7.4)	6.40 (2.3)	9.42 (5.5)
Operational holding (acres)	15.60 (23.46)	40.86 (14.6)	11.70 (7.76)	20.66 (13.7)

Figures in parenthesis are standard deviations.

size specialized farm contribute almost same (0.8) (Table 2). While in animal shed cleaning, small size specialized farm spent more labour (1.6) compared to commercial farm (1.4) and subsistence rural farm (1.2). Commercial farms employed highest labour (2.0) in stall feeding followed by 1.4 in watering while small sized specialized farm spent more labour in watering (2.0), and less in stall feeding and fodder chopping (1.4). Subsistence rural farm spent highest labour in stall feeding and fodder chopping (1.3) followed by watering to the animal (1.2). Small size specialized farm shows highest response (93%) towards full time involvement in farming followed by subsistence rural farm (90%) and commercial farm (80%). According to Afzal (1997) and Raja (2001) subsistence rural

dairy farms usually involves highest percentage family labor than other production systems.

Livestock Herd Structure

On average small size specialized farm had more milking cows, dry cows, male cow heifers and young stocks as compared to other two meat production systems (Table 3). While commercial farmers had more cow female heifer (11.2) as compared to other livestock rearing systems. Overall distribution of cows in sample respondents showed that commercial farms have more cows (24.2) as compared to small sized specialized farm (18.08) and subsistence rural farm (5.7). Likewise the composition of buffaloes at farms showed that commercial farms kept more milking buffaloes, dry buffaloes and female

Table 2.   Average labour involved in livestock activities

Activities	Subsistence rural farms	Small size specialized farms	Commercial farms	Overall
Veterinary caring	0.8	0.8	1.2	0.8
	(1.0)	(0.7)	(0.8)	(0.9)
Management	0.7	0.8	1.0	0.8
	(0.7)	(0.7)	(0.7)	(0.7)
Cleanliness of shed	1.2	1.6	1.4	1.3
	(1.5)	(1.4)	(0.9)	(1.4)
Watering	1.2	2.0	1.4	1.4
	(1.4)	(1.5)	(0.9)	(1.4)
Grazing	1.0	1.1	0	0.3
	(0.3)	(1.8)		(1.0)
Stall feeding	1.3	1.4	2.0	1.4
	(1.4)	(1.5)	(0.9)	(1.4)
Fodder chopping	1.3	1.4	1.3	1.5
	(1.4)	(1.4)	(0.9)	(1.4)
Involvement in farming				
Full time	90	93	80	87
Part time	10	7	20	13

Figures in parenthesis are standard deviations.

calves as compared to subsistence and small sized specialized farms. The latter kept more male and female heifers and calves as compare to other production systems. Overall more buffaloes are kept on small sized specialized farms (14.88) followed by commercial farms (10) and subsistence rural farms (8.94) (Table 3).

The existence of sheep was almost negligible in the study area. Only small sized specialize farm had 1.31 sheep while there was no tendency towards rearing sheep in commercial farm and subsistence farm. Overall results showed that small size specialized farm had significant number of goats (7.2) compared to commercial farms (3.6) and subsistence farms (0.54).

Average Age, Sale Price and Weight of Sold Meat Animals

The average age of buffalo sold by the respondents for meat purpose was 2.8 years with mean sale price of Rs. 64963.8 and mean weight of 157

Table 3.   Average herd size distribution by meat production systems

Animal types	Subsistence rural farm	Small size specialized	Commercial farm	Overall
Cow	5.70	18.08	24.2	9.51
Milking	1.27	3.63	1.40	1.78
Dry	0.75	4.00	0.00	1.38
Female heifer	1.56	4.00	11.20	2.71
Male heifer	0.24	1.75	1.40	0.63
Male calves (<1y)	0.53	1.13	0.80	1.14
Female calves (<1y)	0.53	1.13	0.80	0.67
Male calves (<2y)	0.40	1.56	0.60	0.66
Female calves (<2y)	0.42	0.88	0.80	0.54
Buffalo	8.94	14.88	10.00	10.25
Milking	1.82	0.88	1.20	1.58
Dry	1.91	2.25	2.60	2.03
Male heifer	0.51	6.13	3.40	1.88
Female heifer	0.82	1.44	0.00	0.89
Male calves (<1y)	0.95	0.56	0.40	0.83
Female calves (<1y)	1.11	0.81	2.20	1.12
Male calves (<2y)	0.91	1.06	0.00	0.88
Female calves (<2y)	0.91	1.75	0.20	1.04
Sheep	0.00	1.31	0.00	0.28
Goat	0.54	7.20	3.6	2.15

kg (Table 4). The comparison of prod-uction system showed that average age, sale price and live weight of sold buffaloes was significantly more at commercial farms than small size specialized and subsistence rural farms. These results show that commercial farms are more special-ized in rearing of meat animals as compared to other production systems. Average age of cow sold by the respondents was 3.1 years with sale price of Rs. 65722.1 and live weight of 210.4 kg. The average age and live weight of cow sold by commercial farms was relatively hi-gher as compared with other farms. The sale price received by commercial farms for selling cow was significantly higher in as compared with other production systems. According to Ahmed and Pasha (2009), weight of beef animal is the most important biological factor to increase the profitability of fattening enterprise and it requires that farmers should provide excess nutrient intake to fattening animals than their body requirements so that live weight of slaughter animal reaches to desirable level within a reasonable time. The results of the present research revealed that beef animals at commercial farms were of highest weight among all production systems and also gaining highest price per animal.

Profitability Analysis of Meat Animals

In the study area, combined average cost of meat production, gross revenue and net revenue of buffaloes was Rs. 57541.8, Rs. 64963.8 and Rs. 7422.1, respectively, whereas for cows the average cost of meat production, gross revenue and

Table 4.   Average age, sale price and weight of sold meat animals

Parameter	Subsistence rural farm	Small size specialized farm	Commercial farm	Total	Signifi-cance
Buffalo					
Average age (year)	2.4	4.3	6.5	2.8	0.001**
	(1.7)	(1.4)	(2.1)	(1.9)	
Sale price (Rs.)	45958.0	70600.0	78333.3	64963.8	0.021*
	(30335.6)	(37673.6)	(47022.6)	(33865.3)	
Weight (kg)	138.3	242.0	292.5	156.7	0.024*
	(100.2)	(107.8)	(109.5)	(109.5)	
Cow					
Average age (year)	3.0	3.0	4.2	3.1	0.503
	(1.50)	(1.4)	(3.3)	(1.6)	
Sale price (Rs.)	51250.0	63416.2	82500.0	65722.1	0.109*
Weight (kg)	189.8	230.8	293.3	210.4	0.225
	(104.0)	(104.9)	(151.4)	(109.0)	

*and ** = Significant at 1% and 5% level, respectively.*
Figures in parenthesis are standard deviations.

net revenue was Rs. 49692.5, Rs. 65722.1 and Rs. 16029.6, respectively (Table 5). The cost of production of meat animals (buffaloes and cows) were higher in commercial farms estimated about Rs. 67820.2 and Rs. 62773.5, respectively. However, production cost of small size specialized farms was Rs. 62856 and Rs. 49619 for buffaloes and cows, respectively while that for subsistence rural farms was Rs. 41949 and Rs. 40872 for buffaloes and cows, respectively.

Main costs incurred by the livestock farmers for both cows and buffaloes were fodder and concentrate. The average cost of fodder and concentrate for buffaloes was Rs. 22097.8 and Rs. 6101.7, respectively. The commercial farms spent Rs. 27525.4 and Rs.7200.0, respectively on fodder and concentrate feeding, followed by small sized specialized farm (Rs. 24968 and Rs. 6990, respectively) and rural subsistence farm (Rs. 13800 and Rs. 4666,

Table 5.   Cost of production of meat animals and net returns (Rs.)

Items	Subsistent rural farm	Small size specialized farm	Commercial farm	Overall
Buffalo				
Concentrate price	4665.8	6990.0	7200.0	6101.7
Miscellaneous price	209.4	687.5	0.0	262.6
Fodder price	13800.0	24968.0	27525.4	22097.8
Labor price	3273.8	3210.7	3095.2	3240.6
Total variable cost	21949.0	35856.2	37820.2	31875.1
Animal purchase price	20000.0	27000.0	30000.0	27333.3
Total cost	41949.0	62856.2	67820.2	57541.8
Gross revenue	45958.0	70600.0	78333.3	64963.8
Net Revenue	4009.0	7743.8	10513.1	7422.1
Cow				
Concentrate price	5743.8	7235.0	12145.0	6273.3
Miscellaneous price	267.2	60.4	0.0	180.6
Fodder price	14587.5	19113.2	22533.3	19331.3
Labor price	3273.8	3210.7	3095.2	3240.6
Total variable cost	23872.3	29619.3	37773.5	29025.8
Animal purchase price	17000.0	20000.0	25000.0	20666.7
Total cost	40872.0	49619.3	62773.5	49692.5
Gross revenue	51250.0	63416.2	82500.0	65722.1
Net revenue	10377.7	13796.9	19726.5	16029.6

respectively). The estimates of the gross revenue received by the livestock farmers from sale of buffaloes showed the higher return to commercial farms of Rs. 78333.3 followed by small size specialized farms Rs. 70600 and rural subsistence farms Rs. 45958. Net profit were higher (Rs.10513.1) in commercial farms followed by small size specialized farms (Rs. 7744) and rural subsistence farms (Rs. 4009).

For cows, average cost of fodder and concentrate was Rs. 19331.3 and Rs. 6273.3, respectively. The fodder and concentrate costs were higher in commercial farm i.e., Rs. 22533.3 and Rs.12145.0, respectively followed by small sized specialized farm (Rs. 19113 and Rs. 7235) and rural subsistence farm (Rs. 14587 and Rs. 5744) respectively. The commercial farms fed more concentrate to their animals to gain higher weight. The cost estimates clearly postulates that feed cost is the highest cost incurred by all red production systems. According to Siemens et al. (1999) feed cost being the main cost of producing beef accounts for 60-80% of total production cost that's why dairy farmers profitability based on their ability to manage balanced rations for meat animals as economically as possible.

The estimates of the gross revenue received by the livestock farmers for cow were Rs. 65722.1. The gross revenue earned by commercial farms were higher (Rs. 82500) followed by rural subsistence farms (Rs. 63416.2) and rural subsistence farms (Rs. 51250). Similarly, net revenue were higher in commercial farms (Rs. 19725), followed by small size specialized farms (Rs. 13797) and rural subsistence farms (Rs. 10378).

The analysis indicates that commercial farms were more efficient and profitable as compared to other meat production systems.

CONCLUSION AND RECOMMENDATIONS

The study concludes that rearing animals for meat production was not common practice in the area. The best male animals are kept by farmers for breeding and the remaining, usually sold for slaughter while the females are kept for future replacements. Normally adult females are culled after 8-10 milking periods. The beef produced from the available cattle and buffalo population is considered as a by-product because these species have traditionally not been raised for producing beef. Most of the meat produced comes from end of career, or emergency slaughter animals. Sacrificial occasion market was the only factor of success in traditional fattening systems. The results clearly indicate that commercialize farmers prefer to keep male calves and goats at the farms as compared to rural subsistence and small size specialized farms for selling at sacrificial occasions. The cost of production of meat animals were estimated high in commercial farms with more net revenue obtained as compared to other two production systems.

It is therefore recommended that:
- Meat production practices may be made available to farmers on commercial basis for increase in the net returns from meat production.
- The establishment of small enterprises for the fattening of animals specifically for meat

production purpose is very important to address the demand-supply gap of meat in Pakistan.

- The trainings related to animal fattening practices and awareness regarding the animal health and management practices is essential to gain the full potential benefits of animal rearing for meat production.

- The business oriented approach should be launched by the government institutions and research departments to guide farmers towards the cooperative meat production system to increase the easy accessibility of fresh meat to the consumers.

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