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Economic Viability of Poultry Farmers in Pakistan: A Case Study of District Mardan, Khyber Pakhtunkhwa

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Abstract | Meat is one of the major sources that fulfills protein and vitamin need of human body. Because of increased urbanization and change in human eating habits the global demand of meat has been increasing. At present, in Pakistan, poultry consumption is the key source of the general masses to get the mandatory protein and nutrients. The foremost impact of the poultry industry is to boost up nutrients value and provide an inexpensive and economical source of meat for the masses. Globally, the poultry industry has shown exponential growth and profitability in the sector is considerably higher. However, in the case of Pakistan both producers and consumers are unable to reap the benefits. Consumers and poultry farmers, the two extreme of value chain are in surplus loss because of no. of agents in the supply chain. Keeping in view the importance of poultry industry, the study has attempted to assess the economic viability of the poultry farmers in district Mardan, Khyber Pakhtunkhwa by evaluating profitability of various actors involved in the poultry industry. The total of 200 farmers, commission agents and consumers were surveyed using multistage sampling technique. Building on quantitative industry figures the study also highlighted various qualitative problems and factors which are responsible for the production, and profitability of the poultry industry in the district. The results of the study revealed that the unfair and unwarranted distribution of profits among producers, commission agent and retailers are the major impediment to the extension of the poultry industry in the district. The results of the study quantified that the commission agent obtain 37% of the abnormal profit which results in inflated consumer prices. At the same time none of the profit get invested back in the industry as producer keep struggling to meet financing requirements. Henceforth, to improve nutrient consumption of consumers steps are required to be taken to provide level playing field to all the agents involved and to provide easy market access to producers.

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1. Introduction

Human health is dependent on healthy and adequate diet. Energy and nutrients are major needs of a human body. No single food with exception of some (like Milk), provide all nutrients that are required by human body. Beside other nutrients, human body also needs fats, oils, protein and vitamins. These

are somewhat also filled through meat consumption in particularly the protein segment. Animal products including meat are the prime source of protein, and are much needed for growth, functioning and repair of the body (FAO, 2020).

1.1 Human meat consumption pattern

Population across the globe has been increasing steadily; with increased urbanization as most of the world population has now been residing or shifting to urban areas. Urbanization has influenced the increase in demand of livestock product globally (WHO, 2020). However, over the past few decades there has been considerable shift in food habits, towards more starchy food, taking away from rich vegetables and meat etc (FAO, 2019). Beside this, the world population is largely non-vegetarian, that may reflect in meat consumption globally. Based on estimates of more than a billion world population, are vegetarians by means of affordability, and much smaller proportion of world population that are vegetarian by choice. Anecdotally, vegetarianism is lifestyle of those who are more concerned toward unnecessarily slaughtering of animals and also concerned about health and the environment (Leahy *et al.*, 2010). On the other hand, increase in pasture land to meet the demand of world food has limitation in relation to the livestock growth. Therefore, meat consumption in the world has increased many folds.

Despite shift toward starchy foods, world meat consumption (includes beef and veal, poultry and sheep: excludes pork, sea food and all other animal meats) stood at 210.17 million tonnes in 2019 vis-à-vis 73.14 million tonnes in 1990. This reflects a Compound Annual Growth Rate (CAGR) of 3.58 percent in selected meat consumption over the last three decades. The increase in poultry consumption has shown a highest CAGR of 5.18 percent in the selected meat categories. The overall meat consumption has doubled per head vis-à-vis world population increase (0.5x increase, CAGR 1.27 percent) during the period 1990 to 2019. In terms of per capita meat consumption, there is an increase from 11.23 kg in 1990 to 22.45 Kg in 2019 (OECD, 2020). The increase per capita consumption is more pronounced in the consumption of the poultry meat. The poultry consumption has increased by almost 4 times from 4.7 kg per capita in 1990 to 14.2 kg per capita in 2019. The increase (1990 to 2019) in per capita sheep stood at CAGR of 1.1 percent, followed by beef and veal by CAGR 0.7 percent.

In terms of share in meat consumption (selected meat categories), the dominance has now shifted to poultry meat. In 1990, the share of beef and veal was more than one-half (52.7 percent) of the total selected meat consumption. The share has now decreased to one-third (33.5 percent) in 2019. The share of poultry meat has increased from just one-third (37.4 percent) in 1990 to now approaching two-third (59.3 percent) in 2019. While share of sheep meet has reduced slightly from 9.76 percent in 1990 to 7.16 percent in 2019.

A mix trend is observed in terms of total quantity consumption of selected meat category in 2019. USA, China and Brazil are top three consumers of Beef and Veal and Poultry in terms of quantity. For beef and veal USA stood at first (12.57 million tonnes), followed by China (7.72 million tonnes) and Brazil (7.46 million tonnes). While for poultry meat consumption; China ranks first (19.58 million tonnes), followed by USA (18.72 million tonnes) and Brazil (9.71 million tonnes). According to OECD data (OECD, 2020), Pakistan ranks at 6th with a consumption of 1.87 million tonnes in 2019 for beef and veal. While for poultry consumption, Pakistan ranks at 21st, with a consumption of 1.39 million tonnes, in the world. The data of sheep meat consumption reveals that China, India and Pakistan are top three countries in this selected meat category. China ranks first (5.13 million tonnes), followed by India (0.72 million tonnes) and Pakistan (0.70 million tonnes) in 2019.

Similarly, the position of the countries in terms of per capita consumption, the mix trend is observed for different meats under the selected category. The per capita consumption of beef and veal in Argentina is recorded higher at 36.69 kg, followed by 26.7 kg in USA and 24.6 kg in Brazil in 2019. Pakistan ranks at 25th position with 6.4 kg per capita consumption for beef and veal. In poultry per capita consumption, Israel ranks first with 65.1 kg, followed by USA at 50.1 kg and Malaysia at 49.0 kg in 2019. In Pakistan, the per capita poultry meat consumption is recorded at around 6.0 kg in 2019, reflecting a position of 31st in the world. For the sheep meat, Kazakhstan stood higher at 8.3 kg per capita, followed by Australia at 7.2 kg and New Zealand at 4.6 kg in 2019. Pakistan ranks at 11 with a per capita consumption of 2.1 kg in 2019.

1.2 Production scenario: Livestock population in the world

From production point of view, the meat production has direct backward linkage with the livestock farming. In parallel to meat consumption, the complementary livestock head population in the world has increased proportionately. The population of cattle and buffaloes has increased by 0.5x (CAGR 0.55 percent) during the period 1990 to 2018. In total, there are about 1.7 billion live cattle and buffalo heads in the world. In line with the poultry meat consumption growth, the poultry birds head in the world has grown by almost 3x (CAGR 2.72 percent) during the period 1990 to 2018. As of 2018, there are more than 25 trillion live poultry birds in the world. The sheep and goats in the world currently stood at 2.25 billion heads, registering a CAGR of 0.79 percent during the period 1990 to 2018 (FAOSTAT, 2020).

China and China mainland is the major contributor in all three categories i.e. cattle and buffaloes, poultry birds and sheep and goats. China and China mainland lead in terms of percent share (percent) in the world poultry bird population. The population of poultry bird in 2018 recorded at 12.6 trillion live heads. This is followed by Indonesia with 9.5 percent share and USA with 8.6 percent share in the world (FAOSTAT, 2020).

In sheep and goats, china and china mainland contribution in the world stood at 26.8 percent with a live head population recorded in 2018 at 302.4 million. This is followed by India with 8.62 percent share and Nigeria 5.42 percent share in the world (FAOSTAT, 2020).

In cattle and beef population, the china and china mainland contribution stood at 10.67 percent, however ranked at no. 3. The main contributor is India in 2018 with its share of 17.6 percent, followed by Brazil 12.7 percent in the world (FAOSTAT, 2020).

Pakistan stood in top ten countries in the world in 2018 for livestock population of cattle and buffaloes, poultry birds and sheep and goats. For cattle and buffalo, Pakistan stood at 5th position with its share of 5.01 percent in the world and the livestock population of 84.9 million. For Poultry birds, Pakistan ranked at 9th with a live population of 527.9 million and share in the world recorded at 2.1 percent. For sheep and goats, the share in the world stood at 4.64 percent, placing Pakistan at no. 4, with a population of 104.6 million (FAOSTAT, 2020).

1.3 Production scenario: Meat production

The meat production globally is projected higher by 16 percent for the year 2025 vis-à-vis the production in 2013 to 2015 (OECD and FAO, 2017). This increase is lower than the increase observed in global meat production of almost 20 percent in the past one decade. Global meat production has increased from 179.5 million tonnes in 1990 to 342.4 million tonnes in 2018, reflecting CAGR of 2.14 percent for the reporting period. Of this, Poultry meat has large share as reflected from consumption pattern as well, with a share of about 40 percent in meat production in the world in 2018. This is followed by beef and buffalo production share of 22 percent in 2018. Pakistan share in world's meat production, poultry meat production and chicken meat production hovers around 1 percent to 1.2 percent in 2018. Share of Pakistan in world's beef and buffalo meat production stood at 2.6 percent in 2018.

Global beef and buffalo meat production has proportional increase with the consumption increasing from 55.3 million tonnes in 1990 to 71.6 million tonnes in 2018. This reveals a CAGR of 0.93 percent during the period 1990 to 2018.

Poultry meat production has grown from 40.9 million tonnes in 1990 to 127.3 million tonnes in 2018, reflecting an increase by 3x with CAGR of 4.14 percent. Of this, chicken meat has the large proportion (share of almost 90 percent in 2018), growing from 34.4 million tonnes in 1990 to 114.2 million tonnes in 2018, with a CAGR of 4.38 percent during the period.

As per the world consumption patterns, the poultry meat is actually the primary driver of meat consumption and production in the world. Compared to other red meats, the world poultry is considered to be most affordable protein. Poultry meat is affordable because of its production cost, which is relatively lower vis-à-vis other meats and is reflected in relatively lower consumer prices. Thus, poultry and poultry meat is the first preferred choice in meat menu both for producers and consumers, respectively. According to OECD-FAO (OECD and FAO, 2017), the production of meat likely to grow at higher pace on the back of increase population, increased consumption

and increase per capita consumption. Production is also expected to increase in the sheep meat sector with an expected global growth of 2.1% per annum, a higher rate than the last decade, and led by China chiefly. The expansion of production is expected in Algeria, Australia, Bangladesh, Islamic Republic of Iran, Nigeria, Pakistan and Sudan (OECD and FAO, 2017).

1.4 The economics of poultry in the world

Historically and traditionally, livestock is the major contributor in the world agricultural sector and a rural phenomenon at rural household level. However, due to increased consumption vis-à-vis increased population, there are commercial activities of livestock farming and breeding in the world. In particularly the poultry sector, the commercial based farming/ breeding is considerably pronounced in the world. Considering the growth of the poultry meat consumption and per capita consumption, it can be stated that the poultry industry has been termed as emerging industry in the world during the last three decades. The projections for future growth are also much prosperous for the industry amongst other selected meat categories.

The poultry industry besides providing meat also linked and advantaged with the supply of eggs to the consumers. The world egg production has increased from 37 thousand tonnes in 1990 to 82 thousand tonnes in 2018, reflecting the increased demand as well as increased per capita consumption of eggs in the world. The per capita consumption of egg per annum has increased from 6.32 kg in 1990 to above 10kg in 2018 (GCDL, 2020).

Studies have proven that poultry sector holds a significant role with in the agriculture sector. The production of poultry meat is influenced by production prices of counter meats i.e. beef and mutton. The population growth and consumer price also affects the consumption of poultry meat. In Czech Republic, it is revealed that changes in the agriculture produce prices also affect the production of poultry meat. That will in turn have an impact on domestic consumption. In Czech Republic, the poultry meat is considered as essential good with substitutes availability that have an impact on demand patterns in the country (Rumánková *et al.*, 2012). In Turkey, the market structure revealed the consistent oligopolistic behavior of poultry segment that translates into consumer surplus losses. The historical decomposition of prices for broiler chicken in Turkey revealed that profitability in the sector is considerably higher (Özertan *et al.*, 2014).

1.5 Meat consumption pattern in Pakistan

As in the contemporary world, the objective of food safety is gradually becoming one of the most crucial and critical among all. As presently in the unindustrialized world, most of the inhabitants do not get enough food to meet the nutrients need for a healthy and productive life. This leads to malnourishment of most of the people in the society as a result causing slow productivity. Furthermore, for a good health and stable life, a balanced diet is indispensable. Proteins are one of the important components of a balanced diet. The two chief sources of proteins are animals and plants. The protein is a must needed ingredient of human diet, and the standard protein requirement in a diet is 102.7 gram per person per day (Abedullah and Bakhsh, 2007). Pakistan is among the countries where large number of population is non-vegetarian (Memon *et al.*, 2015). Despite this, in Pakistan, human nutrition lacks animal protein, as around 66% of households in the country have no animal protein in their daily food (Maqbool, 2002). Thus, the per capita consumption of protein in Pakistan is considerably low vis-à-vis standard requirements. The per capita consumption stood at 69.61 gram per person per day (PES, 2019). This situation shows immense gap between the supply and demand of proteins in the country. This can be mainly attributed to affordability in developing economy of Pakistan where the proportion of middle class population and the population below poverty line is considerably high. Meat consumption both in terms of calories and/ or expenditures found higher in rich people (Leahy *et al.*, 2010).

Generally, in Pakistan beef, milk, sheep, and poultry are the foremost sources of animal protein. Of the total meat production, share of beef is almost 50% of the total meat production in 2012 (Memon *et al.*, 2015). The elasticity point of view amongst the three major meats in Pakistan, there is an indication of substitutability (cross price elasticity) between beef, chicken and mutton. The cross price elasticity between beef and chicken shows high substitutability while substitutability is low in the case of beef and mutton. Own price elasticity is inelastic in all cases and there is a small difference between compensated and uncompensated elasticity. While the cross-price

elasticity indicates substitutability between beef and chicken, beef and mutton, and chicken and mutton; the substitutability is particularly high in the case of beef and chicken. The expenditure elasticity of chicken and mutton show that chicken and mutton are luxury goods while beef can be considered as normal good. The result implies an increase in the demand for beef, being a normal good, as a result of an increase in population. However, elasticity in terms of substitutability reveals that price has important phenomenon for changes in demand in the country and has important implication for policy makers as well as for producers in particularly for poultry meat producers (Memon *et al.*, 2015).

1.6 Poultry industry in Pakistan

Poultry farming is a strategic branch of the livestock sector (Barbacaru, 2013), that falls in high returns in terms of profitability with high risk from diseases as well. In Pakistan, poultry farming is found in three different tiers that include industry-intensive, household intensive, and household extensive. The industry-intensive segment in Pakistan has evolved in the last three decades.

In line with global trends, Poultry industry in Pakistan has shown a prodigious growth since 1971.This growth has been reflected in the present turnover of about 750 billion PKR (Pak Rupees), providing sufficient requirement of industry status (Liaqat, 2018). Total accumulated investment in the poultry segment stood at 1.17 trillion PKR in Pakistan (An Overview of Poultry Industry, 2020), with employment of about 1.5 million (Hussain *et al.*, 2015). In terms of economic contribution the sector is also a consumer of about 190 billion PKR worth of agriculture produce and by products. About 40 to 45 percent of the meat consumption in Pakistan is from poultry meat. Beside meat production of 1.44 billion kg per annum, the poultry sector also produces 17.5 billion table eggs per annum (An Overview of Poultry Industry, 2020).

Nonetheless, as compare to other meat avenues, there is a big potential in the poultry industry to increase its market share in country. The industry can also play a role to bridge the gap between protein supply and demand with most economical and effective way, whereas poultry meat have an overriding section of protein. Presently in the country, the existing poultry infrastructure has the capacity to reduce the gap between supply and demand of proteins if the government addresses some of the basic economic problems of the poultry industry. However, overall there is a vital role of poultry industry in reducing the gap, that can be seen in terms of stabilization in the prices of beef and mutton prices, making meat affordable relatively to most of the Pakistani population (Hussain *et al.*, 2015).

In Pakistan poultry plays a significant role to provide nutrition and food supply. Furthermore, it directly and indirectly provides a healthy and inexpensive meat to a big chunk of poor people in the country, for whom poultry is the foremost source of vitamins and proteins (Abedullah and Bakhsh, 2007). Usually, poor people can buy poultry meat, chicken and eggs easily. Moreover, the share of poultry in Pakistan GDP is around 3.1% (PES, 2019). Furthermore, the performance of the poultry industry is overwhelming; nevertheless, the sector has enormous potential to produce food security and additional employment and investment opportunities for the service provider to upsurge household income in the country.

1.7 Challenges to poultry industry

The poultry industry is facing numerous problems and challenges in Pakistan particularly in market business operations and marketing. The problems of the industry can be solved by working in certain directions and to follow the instructions of poultry scientists. Usually, in Pakistan the poultry farming is managed purely in traditional lines without modern technology. Further the marketing practices of the industry are pivoting around commission agents. Hence it makes the poultry farming very inefficient. Moreover, most of the farmers are uneducated and not up to date, so they are producing broilers without anticipating the future supply and demand in the market. Therefore, in most cases, they make losses due to elevated market supply.

Despite traditional practices and not using modern technology, the imported and improved breed of poultry put the industry in competitive lines and makes it more attractive for investors. The government also exempted the industry from income and sales taxes and fortified to export eggs and chickens at subsidized prices. Though, the productivity of native birds was low and not considered economical for eggs production (Maqbool et al., 2005).

There are vast differences in terms of agricultural and other economic activities amongst provinces of Pakistan. This is mainly because of heterogeneity of soil, weather and presence of economic opportunities. Thus, the province of Khyber Pakhtunkhwa, the poultry industry could not evolve, and considered to be newfangled and still in emerging phase. Within the provincial boundary, one of the district, district Mardan, is considered as far ahead amongst other district (except district Peshawar) in terms of robust poultry production. The district is constantly contributing in the province's economy via poultry and other industries (Hadi *et al.*, 2018). So far different studies have been conducted with different economic aspects of the poultry in the country, e.g. economics efficiency (Hadi *et al.*, 2018), profitability analysis (Mohsin *et al.*, 2008), trading system, and economic problems (Ali *et al.*, 2014; Omar, 2014; Udho and Etim, 2009). However, to the best of our knowledge yet no study has been conducted in the economic profitability of pouty industry in the district Mardan. Moreover, due to high population and change in the lifestyle the demand for broiler meat is expanding in the province. Hence, to cater the evaluated demand the productivity of broiler meat needs to be increased. Nevertheless, the productivity can be augmented through innovation and to ensure the just share of the producer in the profit. It is very important for the survival of the industry that government and policymakers safeguard the interest of all stakeholders. Otherwise producer will have no incentive to take risk and remain in the industry. Therefore, the purpose of the study is to evaluate the profitability of the poultry for the various actors involved in the poultry industry. Moreover, the study suggests to the policymakers that they can take necessary measures to make the industry more viable and economical for both producers and consumers in the district.

2. Materials and Methods

A primary survey was conducted in district Mardan, Khyber Pakhtunkhwa to assess the objective of the study. The data was collected from the farmers, consumers and retailers respectively in the district. However, only those commission agents were interviewed who are linked with the concerned farmers. Data was collected from all stakeholders involved in the poultry industry, in 2019, all stakeholders in the poultry ranging from the producer, commission agent and to ultimate consumers were observed. Furthermore, due to time and financial constraints a total of 200 farmers, commission agents and consumers were interviewed, using multistage sampling technique. It the first stage we select the following three main union councils Manga, Par Hoti and Sawaldher of tehsils Mardan and Katlang as its population of the farmers are well documented. However, within the union council the 200 samples are selected randomly by following formula (Cochran, 1977).

$$NI = \frac{n}{N} \times Ni$$

Table 1 exhibits the sample size in each selected union council of District Mardan:

Table 1: Selection of the sample size.

Union council	n	N	Ni	NI =n/N×Ni
Manga	200	820	300	73
Par Hoti	200	820	250	61
Sawaldher	200	820	270	66
Total	----	----	820	200

Note: n = Total sample size i.e. 200.

The study used various variables to estimate the profit margin, i.e. Price, Total Cost, Total Profit, Profit of Producer, Profit of Commission Agent (CA), Profit of Retailor, Input Cost. The study also estimated the coefficient of variation (CV) to calculate risk, which is generally considered as by businessmen as crucial components during decision making process. The various types of variables to estimate the profit margin are reported with their short definitions / description in table (Table 2):

The following mathematical specification was applied to estimate the profit margins of the producer, commission agent and retailer. To estimate total and marginal revenue for the purpose the study applied the subsequent equations: Total Revenue (TR) is equal to $p.q$ whereas p shows price and q quantity while Marginal Revenue (MR) is $dTR/dq = p$.

Henceforth, the profit can be derived as: π= TR-TC, whereas: π is profit, and TC is total cost. Based on the above setting the study estimated profit, for producer, retailer and commission agent respectively. The detail of the profit specification is: π_p = TRP-TCP where π_p shows the profit of the producer while TRP and TCP represent total revenue of producer and total cost of the producer, respectively.

Table 2: Variables of the study.

Variables	Description	Definition	Unit
P	Price	Price per 20 KG of poultry	PKR
TC	Total Cost	Cost on the production of 20 KG poultry	PKR
π	Total Profit $\pi = \pi_p + \pi_c + \pi_r$	Total Profit on 20 KG poultry	PKR
π_p	Profit of Producer π_p = TRP- TCP	Producer's Profit on 20 KG poultry	PKR
π_c	Profit of Commission Agent (CA)	CA's Profit on 20 KG poultry	PKR
π_r	Profit of Retailor	Retailor's Profit on 20 KG poultry	PKR
C	Input Cost	Price of inputs used in Poultry production	PKR

Likewise, π_c=PP-SP-CS where π_c shows the profit of the commission agent while PP, SS and CS represent total purchase, selling price of the commission agent and cost of services provided by the agent, respectively. Similarly, π_r= RPP-RSp where π_r shows retailer's profit while RPP and RSP are retailer's purchase price and retailer's sale price, respectively.

On the same line we assessed total profit is the summation of producer profit, retailer profit and commission agent profit, respectively. Hence, total profit is equal to ($\pi = \pi_p + \pi_c + \pi_r$).

Hence, the profit share of producer (PSP)is PSP= $\pi_p / \pi \times 100$, while profit share of commission agent (PSC) and profit share of retailer (PSR) are PSc= $\pi_c / \pi \times 100$ and (SRP) PSR= $\pi_r / \pi \times 100$, respectively.

Besides, profit seeking process one of the crucial components which generally considered by every businessman during decision making process is risk. Therefore, the study also estimated the coefficient of variation (CV) of the profit to depict the risk of all stakeholders (Abedullah and Bakhsh, 2007).

There are several methods of risk management, however, the most used method of risk assessment are CV, stochastic dominance, and the first safety rule (Maranan, 1983) Nevertheless, to investigate the price risk in broiler production the study uses a CV method. As CV is easily estimated and give more robust results in the given situation. Hence, the study considers the following prearranged of CV formula to calculate its values. $CV = [\delta^2_p / \overline{P}] \times 100$. Where $\overline{P}$ shows average monthly prices and δ^2_p shows variance of the monthly prices (Abedullah and Bakhsh, 2007).

3. Results and Discussion

In poultry, there are many supply chains through which poultry birds transfer from producer to consumer. Normally, commission agent buys poultry from producers and then distributes them to retailers. The detail of the net supply to numerous mediators is shown in Table 3. The result shows that the net margin of commission agent was higher as compared to producers and retailers. It signifies that the commissions agents have the uppermost net margins although their role is not that much significant for industry. On the other hand, producer is the principal pillar of the industry, which plays an essential role in industry but he is just getting a minor share of the profit.

Table 3: Margin of producers, commission agent and retailor.

Description	PSP	CSP	RSP
Price per 20 kg	3,300	3,850	4,410
Marginal revenue	400	550	550

PSP (Producer's selling price), CSP (Consumer's Selling Price) and RSP (Retailer's selling Price)

Table 4 reveals the share of the profit of producer, commission agent, and retailer respectively. The results indicate that the margin of the commission agent, producer and retailer in absolute terms were 400, 550 and 560 as per 20 kg, respectively. Moreover, the percentage profit of producer, commission agent and retailor were 29% and 37% and 34% respectively. On average, the retailer's marketing costs were Rs. 100 while the marketing margin was Rs. 460 (Table 4). Hence, it shows that in profit the combined share of the commission agent and retailers were approximately 71%, which are 14% and 75% in previous studies (Abedullah and Bakhsh, 2007; Qazi, 1989). Moreover, (Maqbool et al., 2005) showed that a greater proportion of profit is received by producer than intermediaries, which is unlike from this study.

These results suggest that the marketing margins for commission agents and retailers are higher than the producer; even the commission agent's profit

is portentous and uppermost from both producers and retailers. Due to lack of information, education, and accessibility, the commission agents are easily manipulating and exploiting the producers. Moreover, the producers were facing liquidity constraints and always in rush to pay the loan of the input supplier. Therefore, the producers' elevated demand of cash weakens his bargaining power.

Table 4: Profit share of producers, commission agent and retailor.

Description	Price per KG	Revenue (pq) 20kg	Margin	Total cost	Profit	Share in profit
Producer	165	3,300	----	2900	400	29%
Commission Agent	192	3,850	550	50	500	37%
Retailor	220	4,410	560	100	460	34%

Source: *Author's estimates based on the primary data*

The supply chain of the broilers is controlled by the commission agents and hence they force the farmers to sell their products at subsidiary prices. Farmers cannot manage to keep broilers after the recommended growth period, as after the quantified period a very preeminent risk is involved in the process. Furthermore, after that recommended growth period than the birds' weight is also not snowballing significantly while the cost of production does. Moreover, rapid price changes, underweight, and high commission costs were the main issues of the current marketing system. Besides, several farmers believed that brokers were not respected business ethics while maximizing profits. They exploited the farmers by various methods like manipulating price, weighing, and underweight of the poultry.

The average price ranged between Rs. 220 in November and Rs. in June (Table 5) in year 2019. Moreover, in July weather is too hot and it easily affects the supply of live broilers. Even though demand is also deteriorating significantly in the summer which affects prices. Nevertheless, our results suggest that supply shortages play a dominant role in the rise in prices in July. The results also exhibited that price oscillations were greatest in May and June (Table 5), probably due Eid al-Adha or Eid Qurban where the demand for broilers meet drastically decline. Similarity price oscillations were also taken place in February perhaps due to the end of the wedding seasons. In Pakistan weddings are held seasonally, usually, people prepare to marry from October to February, and chicken is one of the compulsory dishes of the wedding menu (Abedullah and Bakhsh, 2007)

Table 5: Average prices and coefficient of variation.

Month (2019)	Average price	CV
January	207.712	92.901
February	190. 221	87.109
March	198.019	72.019
April	200.651	43.01
May	203.671	60.981
June	160.981	62.109
July	165.981	65.198
August	170.871	35.901
September	190.890	42.187
October	201.091	30.918
November	220.011	60.910
December	218.910	35.981

The marketing of broilers is a crucial issue for the farmers as the farmers are forced to sell their products at manipulated prices as it is hard for the farmers to keep broilers after the recommended growth period. As a result, producers have been unable to build direct relationships with consumers and hence producers are not getting the just prices, while the commission agents are getting maximum willingness to pay of the consumers. It is one of the main obstacles in improving the contribution of poultry to protein intake. Rather than demand and supply the commission agents/ wholesalers are the main actors to determine the market price. Due to this, the given situation creates market imperfectness, which leads to exploitation of producers and consumers. Moreover, fluctuations in supply affects both consumers and producer's welfare. Nevertheless, middlemen play a key role in setting retail prices. There are several reasons through which the prices are insensitive to the producer. First, there is no direct relation between producers and consumers, which does not allow producers to understand consumers' behavior. Second, lack of training, information, investments and developed infrastructure among the poultry farmers. Third, on average 90 percent of the farmers are facing credit constraints.

Conclusions and Recommendations

The study was conducted in Mardan, Khyber Pakhtunkhwa to investigate the economic

profitability of the poultry industry in the district. The results show that due to the dysfunctional market process the commission agent are exploiting the farmers at various levels. Moreover, at the same time, the retailers were also exploiting the consumer and getting the maximum price from consumers. Therefore, in this situation it is quite impossible for the poultry industry to significantly contribute to nutrients uptake of the general masses as they are getting poultry at high prices. Hence, the given situation urges the government and key players to develop such type of mechanism which abates the role of the middlemen and provide more level playing field to producers. Moreover, to improve the poultry industry the government need to develop a strong linkage and cooperation between academia and the poultry sector where R and D from academia can be implemented in farming and business purposes. Such type of linkages, training programs, and cooperation will provide potential to push the poultry industry to the next level in Pakistan. The government should also take the initiative to issue regulations that producers can sell their output directly in the market without involving the middlemen. The abnormal profit of the commission agents also hampers expansion of poultry industry and reduces the demand for poultry by affecting real purchasing power of consumer.

Novelty Statement

The study is first of its kind which has attempted to assess the economic viability of the poultry farmers in district Mardan, Khyber Pakhtunkhwa by evaluating profitability of various actors involved in the poultry industry.

Author's Contribution

Manzoor Hussain Memon, Khalid Khan, and Anjum Parvez, completed this study under the supervision of Professor Guo Xiangyu. However, Sarfaraz Ahmed Shaikh, Khan Mir Khan, Mohammad Nasrullah, and Saima Liaqat helped in data collection, conducting the experiment, and did statistical analysis .

Conflict of interest

The authors have declared no conflict of interest.

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