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Value chain analysis of Kadaknath chicken in Madhya Pradesh and Chhattisgarh

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Abstract This paper identifies the production and marketing systems of Kadaknath poultry breed by mapping and analyzing the value chains in Madhya Pradesh and Chhattisgarh, the former considered as the cradle of Kadaknath rearing. Qualitative and quantitative data regarding type of chain actors and their interactions were gathered through personal interview method. Farmers/producers, traders, retailers, road-side restaurants/Dhabas and Krishi Vigyan Kendras (KVKs) are the major chain actors involved in identified value chains in the study area. Quantitative mapping reveals that majority (38%) of the birds is sold by farmers to traders and to ultimate consumers at the farm gate (33%).About 39% of the birds procured by traders are exported to other districts, while 31% and 22% of the birds are sold by traders to road side Dhabas and ultimate consumers, respectively. Of the total value added, traders in fresh/raw chicken chains and restaurants/Dhabas in value added chains capture significant shares. Some policy suggestions have been made to streamline the Kadaknath value chains towards integrated and inclusive production and marketing systems so as to benefit resource-poor farmers in the study area.

Keywords Value chain, economics, poultry production, backyard poultry, price spread

JEL codes Q11, Q13, Q18

Introduction

Livestock production in India is intrinsically linked to agriculture and the sector plays a crucial role for the nation's overall food and nutritional security. *In the context of union government's mandate of doubling farmers' income by 2022,* livestock and poultry have been considered as one of the flagship enterprises for farm diversification, which in turn helps in mitigation of farmers' income fluctuation and income enhancement. According to the estimates of the Central Statistics Office (CSO) livestock sector contributed 27.40 per cent of the gross value added (GVA) from agriculture and allied sector in 2018 at 2012 prices (GOI 2019).

Indian poultry sector

Poultry sector in India plays a vital role in alleviating rural poverty and enhancing women empowerment.

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This sector has expanded significantly in recent past mainly on account of increased demand for high value animal food products like chicken meat and eggs; the factors driving this increased demand being rising per capita income, increasing trends in urbanization, changing lifestyles and increasing population. In fact, these factors have also contributed, during the same period, to a shift in dietary patterns in favour of animal protein, of which poultry products is a major component. During 2003-2019, the per-annum growth rate (3.05%) in poultry population has been higher that of all other livestock breeds/species, except crossbred cattle. Production of meat and eggs, during 2000-2018, grew at about 10 per cent and 5.6 per cent per annum, respectively, which were higher than the annual growth rate in milk output (4.75%). Also, as a result of significant expansion in poultry production, the percentage change in per capita availability of meat (271%) and eggs (131%) during 2000-2018 has been significantly higher than that of milk (98%). As per estimates from All India Poultry Breeder Association, poultry sector, with a contribution of about USD 17.31 billion to the country's GDP, satisfies hunger of 50 million people through direct and indirect employment (Kolluri, 2020).

Although, the expansion of the poultry sector has mostly been observed in the commercial segment, the backyard poultry farming is also increasing in importance. Commercial poultry segment also has limited implication for poverty alleviation. On the other hand, backyard poultry is practised by mostly the poorer households and are thought to be an excellent tool in poverty alleviation due to their quick turnover and low investment requirement (Permin et al., 2001). Backyard poultry has seen significant growth of over 45.79 per cent per annum during 2012 to 2019, and has reached 317.07 million in 2019 (GOI, 2019). With the contribution of 18.14 billion eggs, backyard poultry, accounted for about 18 per cent of total egg production as in 2019. Within the backyard poultry sector, indigenous fowls contributed 11.52 per cent of total egg production.

Importance of Kadaknath as indigenous breed

The importance of indigenous breeds of chicken in the rural economy can hardly be overemphasized in developing countries, including India. Promotion of indigenous breeds with better adaptability to the local production systems, climatic conditions and higher degree of disease resistance characteristics, will ultimately help in poverty alleviation, women empowerment as well as fulfilling the nutritional requirements of marginalized people (Padhi, 2016.). According to NBAGR (2019), there are 19 registered indigenous poultry breeds in India, which desperately need attention for conservation and improvement of animal genetic resources. Out of these indigenous poultry breeds, one breed is Kadaknath, also known locally as Kalamasi, on account of black colour of its flesh. The breed originated in Alirajpur and Jhabua districts in Madhya Pradesh and is reared mainly by the rural poor and tribal population living in districts in Western Madhya Pradesh and Chhattisgarh.

Kadaknath is popular for its adaptability in village conditions and has claimed aphrodisiac and medicinal properties (Verma et al. 2020). Due to its unique characteristics and high demand, it fetches higher price as compared to other native birds. State and central governments have promoted the rearing of Kadaknath breed, as backyard enterprise, through different schemes in order to improve the livelihoods of resource poor farmers, especially the tribal population. SA PPLPP (2009) conducted a study on the profitability of Kadaknath farming vis-a-vis desi chicken in Jhabua district of Madhya Pradesh and reported that one tribal family can earn around INR 5, 000 per year from a single Kadaknath bird whereas the same figure is around INR 1, 180 for desi bird.According to a study conducted by Mooventhan et al. (2019), Kadaknath birds reach their saleable weight of 1.10 kg in 105-120 days, fetching a price of INR 700-800/kg live body weight in the local market. The authors also reported that this business has helped the farmers to earn a net income of INR 80, 000-90, 000 per year.

However, in spite of the potential inherent in Kadaknath poultry farming in improving farmers' livelihood security, significant challenges are faced in up-scaling this breed, viz. high demand of Kadaknath meat driving the breed under the verge of extinction, endemic nature and regular outbreaks of infectious diseases like Ranikhet disease, indiscriminate breeding with high yielding exotic breeds and unorganized nature of marketing with no systematic linkage among different value chain actors to respond to changes in demand.

Importance of value chain analyses

Value chain can be described as a series of activities essential to bring a product or service from its inception, through the intermediary phases of production, to an ultimate consumer. A simplified version of the value chain includes an input supplier, producer, traders, processors, transporters, wholesalers, retailers and final consumers. Given the role of Kadaknath in poverty alleviation (SA PPLPP 2009; Verma et al. 2020; Mishra et al. 2019) a pro-poor value chain development of Kadaknath is the need of the hour. The first step in this regard is to document the functioning of existing value chains, including the governance mechanism, role of different stakeholders and efficiency of these chains. The results of such analyses would help policy makers to bring positive change in terms of improving their economic efficiency and generate more social benefits like employment generation and gender equity.

In India, studies on value chains in the livestock & poultry sectors are mostly focused on dairy value chains (Birthal et al. 2009; Kumar 2010; Kumar et al. 2011; Wani et al. 2014; Birthal et al. 2017). Some studies are available on the value chain analyses of meat sector (Bardhan et al.2019; Dineshkumar et al.2020). In case of poultry, some studies are found on the role of poultry in livelihood security, poverty alleviation and production & marketing. Studies on comprehensive analyses of poultry value chains, more so for indigenous breeds and focussing on smallholder backyard enterprises, are scant.

As for Kadaknath breeds, there have been few works which have analyzed the economics of Kadaknath rearing at the farm level (SA PPLPP 2009; Sahu et al.2019; Mooventhan et al. 2019) and identified the constraints faced in Kadaknath chicken farming (Verma et al. 2020). However, literature regarding value chain analyses of backyard poultry rearing, with special reference to Kadaknath breed, and focussing on all the value chain stakeholders is scarce.

This paper aims to identify the different stakeholders involved in Kadaknath value chains and map the linkages between them; assess the economics of Kadaknath breed rearing underdifferentrearing systems; and ascertain the performance of value chains in terms of price spread and the distribution of benefits across various stakeholders. The findings are likely to help chain actors to improve the governance and competitiveness of each segment of the chain and help it function efficiently.

Methodology

Study area and sampling

The study was carried out in the states of Madhya Pradesh and Chhattisgarh, located geographically in the central and east-central parts of India. Kadaknath farming has been promoted in this region extensively by different government agencies, given the breed's adaptability to the specific agro-climatic conditions. There are evidences that promotion of this breed as backyard enterprises has helped in changing the lives of tribal farmers in the two states (SA PPLPP 2009; Mishra et al. 2019; Sahu et al. 2019; Mooventhan et al.2019).

Krishi Vigyan Kendras (KVKs), which are typically Farm Science Centres, have the major mandate of technology assessment, validation and refinement at the farmers' fields. They provide a link between various research stations within the national agricultural research system (NARS) and the farmers. KVKs in this region have established hatcheries dedicated to Kadaknath breeds of poultry. The KVKs have not only promoted the breed in these two states, but have also made attempts to popularize the same in adjoining and nearby states. According to Mishra et al.(2019), approximately 2 lakh chicks were supplied to 15 districts of 14 states by KVK of Jhabua in Madhya Pradesh. Apart from KVKJhabua, there are four other KVKs (Chhindwara, Burhanpur, Dhar and Gwalior) in Madhya Pradesh and four KVKs in Chhattisgarh (Dantewada, Kanker, Balrampur and Rajnandgaon), which have established Kadkanath hatcheries. According to Sahu et al. (2019) Dantewada district of Chattisgarh alone produces 4 lakhs of chicks annually by 203 established Kadaknath farms. Mishra et al.(2019) had reported that KVK, Kanker in Chhattisgarh, alone has supplied more than 1.5 lakhs Kadaknath chicks to local farmers as well as to other states.

Nine districts, in which the respective KVKs (five in Madhya Pradesh and four in Chhattisgarh), have established Kadaknath hatcheries and supply Kadaknath Chicks, were categorized into low and high hatchery capacity categories. In the next step, one district was selected randomly from the high and low

capacity categories from each state. Thus, two districts were selected from each of the two states. Multi-stage random sampling design was used to select Kadaknath rearing households, the ultimate sampling units for this study. From each selected district, a list of blocks in which Kadaknath breed has been promoted by the concerned KVKs was prepared. Two blocks were selected randomly from each district. From each selected block, list of villages with Kadaknath breed intervention was prepared. Five villages were then selected randomly from these lists from each block. Thus, this study covered two states, four districts, 8 blocks and 40 villages. For selection of Kadaknath rearing households, sampling frame was prepared by listing households having Kadaknath poultry enterprises. Twenty five per cent of the households from this sampling frame from each village were then selected randomly as ultimate sampling units.

For selecting the value chain actors, viz. traders, wholesalers, retailers, etc., the number of such value chain actors operating in the study area was assessed during the survey and 20 per cent of total number of each actor category was selected subject to the number of chain actors not exceeding 50.

Data

Primary data were collected with the help of a structured and pre-tested interview schedule by personally interviewing the farmers and key-value chain stakeholders in the Kadaknath value chains. The actors who were surveyed included officials from the State Animal Husbandry Department, village representatives (Gram Pradhan), Kadaknath farmers, Kadaknath traders/intermediaries, Kadaknath wholesalers, butchers and retailers. The aim of multi-stakeholder interviews was to map the value chains, identify critical sites/infrastructure, identify people and organizations, process/product movement, and analyze price and quantities generated, sold and consumed.

Analytical framework

Mapping of Kadaknath value chains

The primary data collected from different actors involved in Kadaknath value chain were used to map and quantify the value chain as a visual tool to graphically illustrate the actors involved in the value chain & relationships between them and the flow of the product along the chains from the point of inception to final consumer in terms of volume & value.

Economics of Kadaknath rearing

Cost estimation

The overall cost of rearing birds is an aggregate of the expenditure incurred on the fixed and variable items.The fixed costs include depreciation on durable assets like sheds and equipment. The depreciation on sheds and equipment was worked out using the straight-line method considering the useful life of the asset concerned.The interest on fixed capital (shed, equipment and wire fencing) was calculated at 12% per annum. The components of variable cost include the cost of day-old chicks, feed costs, labour expenses and expenditures on veterinary & health care and miscellaneous items. Cost of feeds was estimated by multiplying the quantity fed to the birds by the prevailing market price in the study area. The value of hired labour, as prevailing in the study area, was taken as such and the value of family labour was imputed based upon the prevailing wage rate in the study area. Veterinary expenditures included expenditures incurred on vaccination, medicines, charges made by the veterinary personnel, etc. Miscellaneous expenditures included costs incurred on repairs of sheds, store and equipments, electricity and water charges, if any.

Estimation of returns

The output variable was the live birds & eggs sold, along with sale of dressed chicken & any other value added products. The volume of these products sold was multiplied with the market price in order to obtain gross returns. The gross cost was then subtracted from the gross returns to arrive at the net returns from Kadaknath farming.

Price spread among various stakeholders in the identified value chains

Price spread along the various actors involved in different identified value chains was calculated. Price spread has two components; one is the cost of performing the various marketing functions which include the transaction costs also and the other part is the profit/ net margins of the various market functionaries involved in moving the birds from the producers till it reaches the ultimate buyer. Total cost

was calculated by adding standard marketing costs and transactions costs. Here the transaction costs involve the costs of travel, communication, transport and storage, loss in quality and quantity during transportation, credit, extension services, market fee, commission charges, and personnel time (own and hired). The estimation of market actors' net marketing margin was computed in two steps. First, gross marketing margin was calculated by subtracting purchase price from the selling price and then net marketing margin was determined by taking the difference between gross marketing margin and total costs.

Marketing efficiency

Marketing efficiency is the measure of the ability of marketing agencies to move the products from the producer, at the minimum cost by extending maximum service, to the ultimate buyer. It is the ratio of market output to marketing cost. Acharya's modified method (Acharya and Agarwal 2001) of calculating marketing efficiency was used to measure the marketing efficiency. Marketing efficiency was computed by considering the price paid by the consumer (RP), total marketing cost (MC) & net marketing margin (MM). One of the indicators of the increased marketing efficiency is the reduction in the cost of marketing and margins of the intermediaries involved in the marketing and the overall increase in the producer's share. According to Acharya's method, higher the value of the index of marketing efficiency (ME), higher is the marketing efficiency and vice versa.

The formula for calculating marketing efficiency was:

$ME = [RP/(MC+MM)] - 1$

Where,

ME = Index of marketing efficiency

RP = Price paid by the consumer

MC = Total Marketing Cost

MM = Net Marketing Margin

Results and discussion

Mapping of value chain

We map the Kadaknath value chain for the combined four districts surveyed in this study by utilizing the information from key informants and group discussions and following the framework developed by Alarcon et al. (2017) (Fig. 1). Private hatcheries and KVKs are the main suppliers of day old Kadaknath chicks to the farmers for their rearing. The 4 KVKs in the surveyed districts supplied 54 per cent of day olds chicks to the farmers while about 10 private hatcheries which

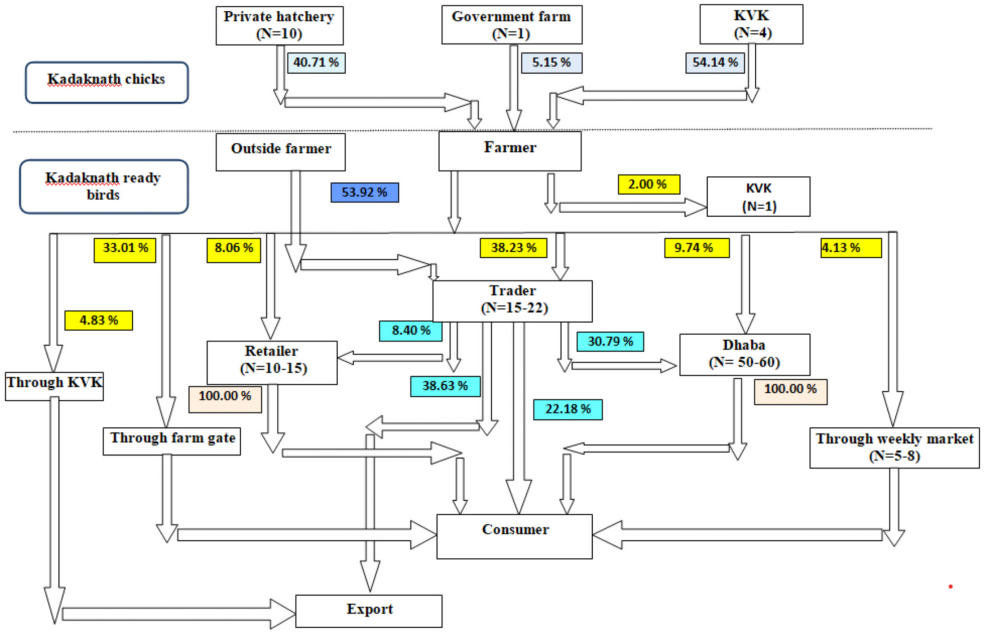

Figure 1 Kadaknath poultry value chain

operated in the study area supplied about 41 per cent of the chicks. One government hatchery farm accounted for remaining (5%) supply. It is estimated that there are about 15-20 traders, 10-15 retailers and 50-60 road side restaurants (Dhabas) operating in the surveyed districts.Majority (38%) of the birds is sold by farmers to traders and at farm gate (33%) to ultimate consumers. About 10 per cent and 8 per cent of the birds are sold by farmers directly to road sideDhabas and retailers, respectively. A small proportion (4%) of birds is sold by farmers to consumers at weekly markets. About 2 per cent of the birds find their way to KVK hatcheries from the farmers, mostly for breeding purpose; and about 5 per cent of the birds are exported to other districts through KVKs. The traders operating in the study area also procure birds from farmers from other districts. Out of the total volume of Kadaknath birds handled by the traders in the four districts, 54 per cent of birds is procured from farmers from other districts, while the farmers from the surveyed districts accounted for 46 per cent of the birds traded. About 39 per cent of the birds procured by tradersareexported to other districts, while 31 per cent and 22 per cent of the birds are sold by traders to road sideDhabas and ultimate consumers, respectively. Only about 8 per cent of birds are sold by the traders to retailers. The entire volume of birds procured by the retailers and Dhabas are sold to ultimate consumers as fresh and cooked meat, respectively.

Functioning of value chains and their governance

Poor chick supply and high chick price are the major constraints faced by the farmers. Present chick supply (from both government and private hatcheries) is not enough to fulfil the demand, which leads to a high waiting period of one to two months for the farmers. Incidence of sale at farm gate is very high on account of apprehensions on the part of farmers regarding contracting infections from other birds at weekly markets. In fact outbreaks of diseases like Ranikhet disease has been frequent in the recent past in districts like Dhar, where significant proportion of the birds are traded at weekly markets. Apart from this, market charges and transportation costs also act as disincentives for the farmers to sell their birds at the markets. In districts, where markets for the breed is well-developed, like Jhabua, sale of birds start mostly at about 5 months of age with all the birds being disposed off within s span of 1-2 months. Demand for the birds by local consumers is low and infrequent, with major demand coming from tourists, educated and salaried individuals. Birds reared are mostly exported to almost all parts of India. Due to lack of organized marketing farmers most often lack market information, in terms of buyers and market prices, which proves to be another impediment. Demand for chicks and birds from Jhabua has increased in recent past from other districts and states, on account of their Geographical Indication (GI) status (GOI 2018). The breed is thus reared in other states also, and as such the demand for ready birds for consumption from the district has decreased. Generally, demand for Kadaknath birds increases from July-August and reaches peak during November-December. Supply remaining fixed the demand-supply gap as such fluctuates during the peak season which reflects in significantly higher prices. In spite of proximity to major centre of demand for Kadaknath (like Indore), the market remains underdeveloped in districts like Dhar. Non-governmental organizations (NGO's) are functional in some districts, like Dhar, where farmers are provided with chicks, feed and built-in sheds free of cost. Large numbers of birds become ready for marketing at the same time, thus resulting in surge in supply. This along with free provision of inputs significantly lowers prices, thus leading to adverse implications for economic sustainability of commercial enterprises. Due to low demand in underdeveloped markets like Dhar and Dantewada, the birds are reared for longer periods, sometimes almost up to 1 year (instead of 6 months by which the birds are ready for marketing) which leads to increased cost of production. Markets for Kadaknath have witnessed significant development in Chhattisgarh, especially in districts like Kanker. The role of KVK and State Animal Husbandry Department has been crucial in this regard in these districts. Chick supply has been streamlined and regularized mostly by establishment of high capacity hatcheries in farms owned by educated farmers. Marketing of Kadaknath chickens has also been promoted through exclusive retail outlets along highways. Self-help groups (SHGs) have also been promoted by NGOs which supply inputs at market price, with the exception of free technical support and subsidy for sheds. In spite of this, demand fluctuation leads to constraints in timely marketing of the birds.

Table 1 Distribution of sample Kadaknath farmers

Sl No.	State	District	Backyard	Commercial	Group*	Total observation
1	Madhya Pradesh	Jhabua	6	27	0	33
2		Dhar	22	8	0	30
3	Chhattisgarh	Dantewada	0	7	11	18
4		Kanker	10	17	2	29
		Total	38	59	13	110

*10 Farmers in each group

Technical parameters of sample farms

Out of the total 110 farms surveyed in this study, majority (54%) of the farms are commercial, while 35 per cent and 12 per cent are backyard and group promoted (each group comprising approximately 10 farmers), respectively (Table 1). Average number of cycles per annum ranged between 1.89 to 2.31 for backyard and commercial farms (Table 2). On the other hand, each group promoted farm raised only 1.31 cycle per year, on an average. Number of birds (255) reared per cycle is highest for group promoted farms, followed by commercial (187) and backyard (46) farms. However, commercial farms, on average, sold significantly higher number (376) of birds per year than that by group promoted (226) farms, on account of higher cycles raised per year. Due to higher number of cycles, the birds are sold earlier in commercial farms at 25 weeks of age. Backyard and group promoted farms, on average, sold their birds at 30 and 43 weeks, respectively. As such, the average live body weight of birds at the time of sale is lowest for commercial farms (1.18 kg) and highest for group promoted farms (1.52 kg). Birds sold by commercial and backyard farms fetch significantly higher price (Rs. 486 and Rs. 477 per kg live weight) as compared to group promoted farms (Rs. 338 per kg live body weight). Kadaknath birds lay eggs after 6 months of age. Since, each cycle runs significantly longer in group promoted farms, significantly higher proportion (84%) of such farms sell eggs than backyard (11%) and commercial farms (20%).

Costand return structure for chain actors

Farmers

Table 3 elicits the average per day costs incurred by farmers and returns earned by them for rearing Kadaknath birds for different farm categories.Average paid-out cost, across all categories, is INR 261 per farm and INR 0.95 per bird. When imputed value of capital invested and family labour is considered, the total cost amounts to INR 281 per farm and INR 1.05 per bird.

Table 2 Farm category-wise basic information about Kadaknath farms

	Backyard	Commercial	Group	Pooled
Average no. of cycle(s) per year	1.89	2.31	1.31	1.70
Average no of Kadaknathbirdsper cycle	45.92	186.68	255.08	146.14
Average no of Kadaknath chicks procured	88.68	429.29	335.85	300.58
Average mortality rate	15.73	14.91	34.96	17.56
Average no. of Kadaknathbirdssold per year	72.55	376.24	226.31	253.61
Average weight ofKadaknath (per bird)	1.37	1.18	1.52	1.28
Average age at the time of sale (weeks)	29.82	25.67	42.66	29.11
Average selling price of Kadaknath (per bird) (Rs.)	658.84	568.15	551.4	597.5
Average selling price of Kadaknath per kg live body weight (Rs.)	476.53	485.82	338.16	465.16
Average price of Kadaknath egg (Per egg)	16.00	17.40	14.00	15.80
% farms selling Kadaknath egg	10.53	20.34	84.62	24.55

Table 3 Farm category-wise cost of Kadaknath rearing and income measures

Item of cost/ income	(Rs./farm/day)				(Rs. / bird/ day)			
	Back-yard	Commer-cial	Group	Pooled	Back-yard	Commer-cial	Group	Pooled
I. Cost concepts								
1. Expenditure on feed	42.33 (59.45)	278.79 (65.01)	159.79 (71)	183.04 (65.07)	0.61 (59.80)	0.70 (64.22)	0.70 (71.43)	0.67 (64)
2. Expenditure on chick	17.98 (25.25)	92.61 (21.60)	34.07 (15.08)	59.91 (21.30)	0.25 (24.51)	0.24 (22.02)	0.13 (13.27)	0.23 (22)
3. Vety. expenditures	1.09 (1.53)	7.5 (2)	4.92 (2.18)	4.98 (2)	0.01 (1)	0.02 (2)	0.02 (2.04)	0.02 (2)
4. Miscellaneous expenditure	1.32 (2)	9.75 (2.27)	5.7 (2.52)	6.36 (2.26)	0.02 (2)	0.03 (3)	0.03 (3.06)	0.02 (2)
5. Hired labour	0 (0.00)	13.02 (3.04)	0 (0.00)	9.18 (3.26)	0 (0.00)	0.01 (1)	0 (0.00)	0.005 (0.48)
6. Imputed value of family labour	8.08 (11.35)	23.31 (5.44)	18.49 (8.18)	17.48 (6.21)	0.13 (13)	0.07 (6.42)	0.09 (9.18)	0.1 (9.52)
7. Depreciation on fixed assets (shed, equipments, etc.)	0.15 (0.21)	2.94 (0.69)	1.33 (0.59)	1.78 (0.63)	0.002 (0.20)	0.007 (0.64)	0.005 (0.51)	0.005 (0.48)
8. Interest on fixed capital	0.25 (0.35)	4.43 (1.03)	1.64 (0.73)	2.66 (0.95)	0.004 (0.39)	0.01 (0.92)	0.004 (0.41)	0.007 (0.67)
9. Cost A (1+2+3+4+5+7)	62.87 (88.30)	401.07 (93.53)	205.81 (91.09)	261.16 (92.84)	0.89 (87.25)	1 (92)	0.88 (89.80)	0.95 (90.48)
10. Cost B=Cost A+8	63.12 (88.65)	405.51 (94.57)	207.45 (91.82)	263.82 (93.79)	0.89 (87.25)	1.01 (92.66)	0.89 (90.82)	0.96 (91.43)
11. Cost C=Cost B+6	71.2 (100.00)	428.81 (100.00)	225.93 (100.00)	281.3 (100.00)	1.02 (100.00)	1.09 (100.00)	0.98 (100.00)	1.05 (100.00)
II. Income measure								
12. Gross income	127.78	603.35	354.99	409.71	1.81	1.56	1.51	1.64
13. Farm labour income=12-9	64.91	202.28	149.19	148.55	0.92	0.55	0.63	0.69
14. Family labour income=12-10	64.66	197.85	147.55	145.89	0.91	0.54	0.62	0.68
15. Net income=12-11	56.58	174.54	129.06	128.42	0.78	0.47	0.53	0.59

Figures in parentheses indicate percentage

Among all the cost components, expenditures onfeed and chicks account for overwhelming shares (65% and 21%, respectively) across all farm categories. Total cost per farm is highest for commercial farms (INR 429 per farm) and lowest for backyard farms (INR 71 per farm). Gross and net income per farm is significantly higher for commercial farms (INR 603 and INR 175, respectively) than that for group promoted (INR 355 and INR 129, respectively) and backyard (INR 128 and INR 57, respectively) farms. Although, gross and net income per farm are significantly higher for commercial farms as compared to backyard farms, the same is however higher for the latter category on per bird basis. The average gross income per bird (INR 1.81) is higher than that for commercial farms (INR 1.51) on account of higher price fetched by backyard farms for their birds (Table 2). Net income per bird is also higher for backyard farms (INR 0.78) as compared to that for commercial farms (INR 0.47).

Agencies for sale by farmers

Five main agencies for sale of Kadaknath birds were identified in the study area, Farmers across all farm categories mainly sold to multiple agencies. Only in case of direct sale to ultimate consumers, significant proportion of backyard and group promoted farms sold

to this agency exclusively (29% and 38%, respectively) (Table 4). Apart from exclusively selling to consumers, backyard farmers (39%) mainly sold directly to consumers and road-sideDhabas. Group promoted farmers (38%) also sell to combination of agencies comprising direct sale to consumers and KVKs (who help them in linking to markets in other districts). KVKs also procured birds from group promoted farmers for breeding purpose in their hatcheries as about 8 per cent of this category farm sold to KVKs for this purpose along with direct sale to consumers. Commercial farms mostly sold to multiple agencies comprising traders, retailers &Dhabas (29%) and traders, retailers & direct sale to consumers (24%).

Table 4 Farm category-wise proportionKadaknath birds sold to and farms selling to different agencies

Multiple / exclusive agency	Backyard				Commercial				Group				Pooled			
	No. of birds	% of birds	No. of farms	% of farms	No. of birds	% of birds	No. of farms	% of farms	No. of birds	% of birds	No. of farms	% of farms	No. of birds	% of birds	No. of farms	% of farms
Agency (1+2+3+4)	—	—	—	—	6717	30.26	8	13.56	—	—	—	—	6717	24.08	8	7.27
Agency (1+2+3)	344	12.48	4	10.53	4384	19.75	14	23.73	780	26.51	1	7.69	5508	19.74	19	17.27
Agency (1+3+4)	270	9.79	1	2.63	6139	27.66	17	28.81	340	11.56	1	7.69	6749	24.19	19	17.27
Agency (3+4)	959	34.78	15	39.47	230	1.04	1	1.69	—	—	—	—	1189	4.26	16	14.55
Agency (1+3)	290	10.52	4	10.53	2492	11.23	9	15.25	—	—	—	—	2782	9.97	13	11.82
Agency (2+3)	271	9.83	3	7.89	170	0.77	1	1.69	—	—	—	—	441	1.58	4	3.64
Agency (6+3+5)	—	—	—	—	706	3.18	2	3.39	—	—	—	—	706	2.53	2	1.82
Agency (3+5)	—	—	—	—	212	0.96	1	1.69	174	5.91	1	7.69	386	1.38	2	1.82
Agency (1+2)	—	—	—	—	140	0.63	1	1.69		0.00		0.00	140	0.50	1	0.91
Agency(6+3)	—	—	—	—	668	3.01	4	6.78	950	32.29	5	38.46	1618	5.80	9	8.18
Agency 1	—	—	—	—	340	1.53	1	1.69	—	—	—	—	340	1.22	1	0.91
Agency 3	623	22.60	11	28.95	—	—	—	—	698	23.73	5	38.46	1321	4.74	16	14.55
Grand total	2757	100.00	38	100.00	22198	100.00	59	100.00	2942	100.00	13	100.00	27897	100.00	110	100.00

Agency 1: Traders; Agency 2: Retailers; Agency 3: Consumers; Agency 4: Road-sideDhabas; Agency 5: KVKs for breeding purpose; Agency 6: Export to other districts through KVKs

Traders

Table 5 presents the average costs of procurement and sale of Kadaknath birds by traders. Traders were observed to operate in allthe surveyed district except Dantewada. Overall, across the remaining districts, for one kg of carcass, the average cost is estimated INR 741, of which 99 per cent is for the purchase of the live birds; remaining 1 per cent being accounted for by marketing & transaction costs. The total cost incurred by traders is highest in Jhabua (INR 838 per Kg), and lowest in Kanker (INR 688 per kg). Price received by the traders per kg carcass weight is also higher in Jhabua (INR 921) as compared to the same in Dhar (INR 778 per kg) and Kanker (748 per kg). As such, for each kg of carcass weight, the traders in Jhabua earned the highest net profit (INR 84), followed by Kanker (INR 60) and Dhar (INR 57).

Retailers

Retailers are operational in Jhabua and Kanker districts only. The costs to retailers are comprised of the fixed cost of their establishments, utensils and equipment. The variable costs include transport costs of the birds, wages and miscellaneous expenses. Retailers purchase both from the traders and directly from the farmers. Table 6 reveals the average cost incurred and returns earned by

Table 5 Costs incurred by traders in procurement and marketing of birds

(INR per bird per week)

Particulars	Jhabua		Dhar		Kanker		Pooled	
	Per bird	Per kg effective carcass weight	Per bird	Per kg effective carcass weight	Per bird	Per kg effective carcass weight	Per bird	Per kg effective carcass weight
Purchase price of bird	582.77	828.66	529.19	712.23	475.45	679.56	521.47	731.49
Marketing & transaction cost								
Transportation cost	2.00	2.84	2.05	2.76	2.00	2.86	2.01	2.83
	(31.10)	(31.01)	(31.06)	(31.05)	(35)	(35)	(33)	(33)
Labour cost	0.74	1.06	1.18	1.59	0.52	0.75	0.77	1.07
	(11.51)	(11.57)	(18)	(18)	(9.08)	(9.16)	(12.50)	(12.41)
Misc. expenses	3.69	5.26	3.37	4.54	3.21	4.58	3.39	4.76
	(57.39)	(57.42)	(51.06)	(51.06)	(56.02)	(56)	(54.92)	(55)
Total marketing & transaction cost	6.43	9.16	6.60	8.89	5.73	8.19	6.18	8.66
Total cost	589.20	837.82	535.80	721.11	481.17	687.74	527.65	740.15
Selling price	646.31	921.33	578.73	777.66	524.55	747.76	581.96	815.42
Net margin	57.11	83.51	42.93	56.55	43.38	60.02	54.31	75.27

Table 6 Costs incurred by Retailers in procurement and selling of carcasses/meat cuts

(INR per bird per week)

(Purchase from trader)

Particulars	Jhabua		Kanker		Pooled	
	Per bird	Per kg effective carcass weight	Per bird	Per kg effective carcass weight	Per bird	Per kg effective carcass weight
Purchase price of bird	633.83	876.86	567.00	724.30	600.42	800.58
Fixed cost						
Interest on fixed capital	0.64	0.90	1.54	1.96	1.09	1.43
	(7.74)	(7.83)	(12.37)	(12.35)	(10.54)	(10.43)
Depreciation	0.41	0.57	0.95	1.21	0.68	0.89
	(4.96))	(4.96)	(7.63)	(7.62)	(6.58)	(6.52)
Total fixed cost	1.05	1.47	2.49	3.17	1.77	2.32
	(12.70)	(12.78)	(20.00)	(19.97)	(17.12)	(16.95)
Marketing &transaction costs						
Transportation cost	2.67	3.71	3.67	4.68	3.17	4.19
	(32.29)	(32.26)	(29.42)	(29.44)	(30.56)	(30.62)
Labour expenditures	2.38	3.31	2.18	2.78	2.28	3.04
	(28.78)	(28.78)	(17.47)	(17.48)	(21.96)	(22.22)
Miscellaneous expenses	2.17	3.01	4.13	5.26	3.15	4.14
	(26.24	(26.17)	(33.10)	(33.12)	(30.36)	(30.21)
Total marketing &transaction cost	7.22	10.03	9.97	12.72	8.59	11.38
	(87.30)	(87.22)	(80.00)	(80.03)	(83)	(83.05)
Total cost	642.10	888.36	579.46	740.19	610.78	814.28
Selling price	686.74	946.06	610.42	781.79	648.20	863.93
Net margin	44.64	57.70	30.96	41.60	37.42	49.65

Table 7 Costs incurred by retailers in procurement and selling of carcasses/meat cuts

(Purchase from farmers)

(INR Per bird per week)

	Jhabua		Kanker		Pooled	
Average live weight per bird (in kg)	1.19		1.27		1.22	
Particulars	Per bird	Per kg effective carcass weight	Per bird	Per kg effective carcass weight	Per bird	Per kg effective carcass weight
Purchase price of bird	605.63	832.56	545.00	705.35	585.42	790.15
			Fixed cost			
Interest on fixed cost	0.35	0.48	1.15	1.49	0.62	0.82
	(5.31)	(5.30)	(14.89)	(14.89)	(8.88)	(8.73)
Depreciation	0.22	0.31	0.68	0.88	0.38	0.50
	(3.45)	(3.44)	(8.74)	(8.74)	(5.42)	(5.34)
Total fixed cost	0.57	0.79	1.83	2.37	0.99	1.31
	(8.76)	(8.74)	(23.63)	(23.63)	(14.30)	(14.07)
			Marketing and transaction costs			
Transportation cost	2.13	2.93	2.00	2.59	2.08	2.82
	(32.57)	(32.59)	(25.82)	(25.82)	(30.05)	(30.16)
Labour expenditures	2.08	2.86	1.58	2.05	1.91	2.59
	(31.85)	(31.85)	(20.44)	(20.44)	(27.60)	(27.76)
Miscellaneous expenses	1.75	2.41	2.33	3.02	1.94	2.61
	(26.82)	(26.82)	(30.12	(30.12)	(28.05)	(28.00)
Total marketing and transaction cost	5.95	8.20	5.92	7.66	5.94	8.02
	(91.24)	(91.26)	(76.37)	(76.37)	(85.70)	(85.93)
Total cost including fixed cost and marketing & transaction costs	6.52	8.99	7.75	10.03	6.93	9.34
Total cost	612.15	841.55	552.75	715.38	592.35	799.49
Selling price	654.26	901.31	591.55	763.59	636.59	855.40
Net margin	42.11	59.76	38.81	48.21	44.24	55.91

retailers, in selling dress Kadaknath meat to consumers after procuring the birds from traders. Purchase price of birds paid by retailers account for overwhelming share of total cost accrued to retailers (99% and 98%, respectively in Jhabua and Kanker).Out of the total offixed costs and marketing & transaction costs, the latter contributed significantly higher shares (87% and 80%, respectively, in Jhabua and Kanker). The selling price per kg carcass weight is significantly higher in Jhabua (INR 946) as compared to the same in Kanker (INR 782). As a result, the net margin accrued to retailers was also significantly higher for retailers in Jhabua (INR 58 per kg carcass weight) than that in Kanker (INR 42 per kg carcass weight). When retailers purchase directly from farmers, the purchase price (INR 833 and INR 705, respectively in Jhabua and Kanker) is lower than the same when purchased from traders (INR 877 and INR 724, respectively in Jhabua and Kanker) (Table 7). As result, the net margin earned by retailers (INR 60 and INR 48 per kg carcass weight, respectively in Jhabua and Kanker) is higher.

Distribution of value addition across chain actors

Tables 8-10 elicit the distribution of benefits per kg effective carcass weight across the Kadaknath value chains. There are two major chains for marketing of Kadaknath chicken in the study area; viz. chain for marketing of fresh/raw chicken for domestic consumers and chain for value added chicken. Roadside restaurants/Dhabas are the only units that sell value-added Kadaknath chicken products in the form of cooked meat.

In regard to marketing of Kadaknath birds as fresh/ raw meat, for the farmer-trader-retailer-consumer chain, the net margin (INR 60 per kg carcass weight) is the highest for traders (retaining 55% of total value added). The net margin (INR 105 per kg carcass weight) for traders is even higher when they procure directly from farmers and sell to consumers. When retailers procure from farmers directly, the net margin (INR 56 per kg carcass weight) earned by them is higher than when they purchase from traders (INR 50 per kg carcass weight). Farmers account for the major shares of consumers' Rupee across all the chains for marketing of fresh/raw meat, ranging from 85 per cent to 92 per cent. When consumers of fresh/raw meat purchase directly from farmers at their farm gate, they pay significantly higher price as compared to what they pay to farmers at weekly markets.

In regard to chains for marketing of value added/cooked meat, the road side Dhabas earn higher net margin (INR 244 per kg carcass weight) when they procure from farmers directly than that (INR 233 per kg carcass weight) when they procure from traders. However, even when the birds are procured from the traders, the share of the Dhabas in the total value added is substantial (79%). The shares of farmers in consumers' Rupee come down in the value added chains (65-70%) as compared to the fresh/raw chicken chains as the Dhabas garner a significant share (29-30%).

Table 11 elicits the results regarding marketing efficiency estimates for identified value chains. Marketing efficiency is highest for farmer-consumer chain through weekly market (24.95) and lowest for the value-added chains, viz. farmer-trader-Dhaba-Consumer chain (1.84) and farmer-Dhaba-consumer chains (2.32), implying the benefits of value addition are not channelled back at the back-end of the marketing chains, mostly on account of predominantly unorganized nature of marketing system.

Table 8 Cost and returns (Per kg carcass weight) across the fresh Kadaknath meat value chain for domestic consumers of fresh/raw meat

Marketing channel	Price	Cost	Net margin	PSCR (%)	Marketing channel	Price	Cost	Net margin	PSCR (%)	Marketing channel	Price	Cost	Net margin	PSCR (%)
Farmer → Trader → Retailer → Consumer	731.49	482.40	249.09	84.67	Farmer → Trader → Consumer	731.49	482.40	249.09	86.57	Farmer → Retailer → Consumer	790.15	482.40	307.75	92.37
	800.58	740.15	60.43	8.00		845.01	740.15	104.86	13.43		855.40	799.49	55.91	7.63
	863.93	814.28	49.65	7.33										

*PSCR: Producers' Share in Consumers' Rupee

Table 9 Cost and returns (Per kg carcass weight) across the fresh Kadaknath meat value chain for domestic consumers of fresh/raw meat

Through farm gate					Through weekly market				
Marketing channel	Price	Cost	Net margin	PSCR (%)	Marketing channel	Price	Cost	Net margin	PSCR (%)
Farmer ↓ Consumer	833.32	482.40	350.92	100	Farmer ↓ Consumer	672.76	449.31	223.45	100

*PSCR: Producers'Share in Consumers' Rupee

Table 10 Cost and returns (Per kg carcass weight) across the value added Kadaknath meat value chain

Marketing channel	Price	Cost	Net margin	PSCR (%)	Marketing channel	price	Cost	Net margin	PSCR (%)
Farmer ↓	731.49	482.40	249.04	64.74	Farmer ↓	775.03	482.40	292.63	69.91
Trader ↓	800.67	741.15	60.52	6.12	Dhaba ↓	1108.56	864.98	243.58	30.09
Dhaba ↓	1130	896.77	233.2	29.14	Consumer				
Consumer									

*PSCR: Producers'Share in Consumers' Rupee

Table 11 Marketing efficiency across the different chains for Per Kg. Carcass Meat

	Farmer-Trader-Retailer–Consumer	Famer-Trader–Dhaba-Consumer	Farmer–Trader-Consumer	Farmer-Dhaba-Consumer	Farmer – Retailer-Consumer	Farmer-Consumer (Through weekly market)
Net price received by farmer	731.49	731.49	731.49	775.03	790.15	646.83
Cost incurred by farmer	-	-	-	-	-	25.93
Trader purchase price	731.49	731.49	731.49	-	-	-
Cost incurred by trader	8.66	8.66	8.66	-	-	-
Trader margin	60.43	60.52	104.86	-	-	-
Total cost/kg	800.58	800.67	-	-	-	-
Cost incurred by retailer	13.70	-	-	-	9.34	-
Total cost to the retailer	814.28	-	-	-	799.49	-
Cost incurred by dhaba	-	96.10	-	89.95	-	-
Total cost to dhaba	-	896.77	-	864.98	-	-
Price paid by buyer/ consumer	863.93	1129.97	845.01	1108.56	855.40	672.76
Retailer margin	49.65	-	-		55.91	-
Dhaba margin		233.20	-	243.58	-	-
Gross market margin	132.44	398.48	113.52	333.53	65.25	25.93
Net marketing margin	110.08	293.72	104.86	243.58	55.91	00.00
Marketing efficiency ratio	5.52	1.84	6.44	2.32	12.11	24.95

Conclusion

The study shows how the major Kadaknath value chains - for fresh meat and value-added cooked meat products - function. All the chains originate from mainly three back-end sources, viz. backyard production systems, commercial farms and Kadaknath groups promoted by NGO's and KVKs. Traders, retailers, road-side restaurants/Dhabas and KVKs are identified as major value chain actors operating in either fresh/raw chicken or value added/cooked chicken chains. Majority of the birds is sold by farmers to traders and to ultimate consumers at farm gate.Major proportion of the birds procured by traders is exported to other districts.In the value-added and fresh/raw chicken chains, restaurants/Dhabasand traders, respectively, garner the major share of benefits. The price premium if any, especially in value added chains are not passed at the backend of the chains to the producers, implying overall lack of systematic linkage across the value chains. Overall, this study identified structural deficiencies and vulnerabilities and provided the framework for intervention policies that can improve system efficiency. These may be promoting scientific practices of Kadaknath production, rationalizing the subsidies given to resource poor to encourage efficiency in production & realizing genuine economies of scale, implementation of integrated and inclusive system for Kadaknath production and sale and creation of awareness about the health and other benefits about the breed among consumers. Establishing and strengthening marketing groups or co-operatives would also encourage the farmers to leverage scale economies and bring them closer to the consumers in the value chain thus removing the inefficiencies which impede their bargaining power.

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