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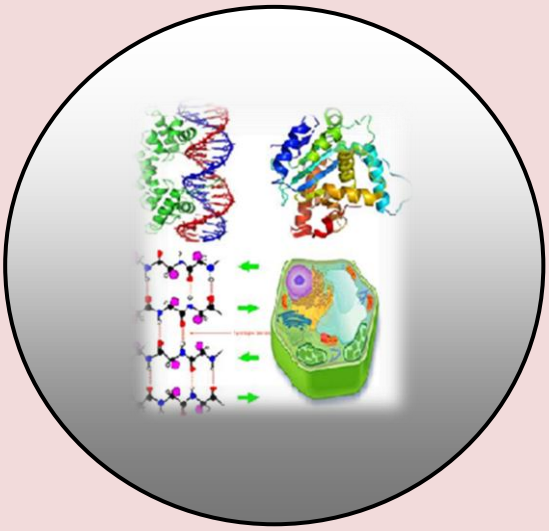

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Kadaknath Farming for Farmers' Livelihood and Empowerment of Indian Rural Economy: A Review

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ABSTRACT

Livestock play an important role in socio-economic development of rural households in India. It contributes about 6 % to the Gross Domestic Product and 25 % to the Agricultural Gross Domestic Product. Among the livestock's, poultry farming contribute substantially to the agricultural economy through meat, feathers, manure and eggs. India has 6.4 lac villages and its 70 % of the population is living in rural areas out of this 25.7 % of total rural people come under below poverty line and poverty gap ratio in rural area is 5.05 %. Most of Indian rural population depends in agriculture for their economic security. Backyard poultry keeping is practiced by majority of the poor and marginalized rural households all over India. Native chicken breed Kadaknath are gaining importance over the years due to their unique attributes. The original name of Kadaknath is "Kalamasi" meaning the fowl having black flesh. However this name is not as popular as the present name Kadaknath. It is an important indigenous breed of poultry inhabitating vast areas of Western Madhya Pradesh mainly the Jhabua and Dhar Districts and adjoining areas of Gujarat and Rajasthan. The Kadaknath breed having fibromelanosis character commonly used both for meat and egg production in tribal and rural areas of India. The black flesh is very delicious, popular among tribal people and used for the treatment of many diseases by tribal. The meat of the Kadaknath breed contains high percentage (25.47 %) of protein and is believed to have aphrodisiac properties. Unemployed youth and women can also earn an income through kadaknath farming. Kadaknath are well known for their tropical adaptability and disease resistance. Backyard poultry requiring hardly any infrastructure set-up is a potent tool for upliftment of the poorest of the poor. It has also been noticed that the demand for rural backyard poultry is quite high in tribal areas. Among the poor villagers, backyard poultry farming is an age-old practice where they keep mostly desi / indigenous birds which scavenge in the backyard and nearby field with very little health care and management.

It reduced migration from rural areas in off season and Kadaknath is working as Bank ATM for rural people. One of the most important positive characters of Kadaknath chicken is their hardiness, which is ability to tolerate the harsh environmental condition and poor husbandry practices without much loss in production. The present review is to document the importance of Kadaknath chicken for rural economy.
Keywords: Kadaknath, Backyard Poultry farming, Indigenous, Tribal farmers, Deshi Breed and Melanin pigment.

INTRODUCTION

Livestock play an important role in socio-economic development of rural households in India. It contributes about 6 % to the Gross Domestic Product and 25 % to the Agricultural Gross Domestic Product. Among the livestock's, poultry farming contribute substantially to the agricultural economy through meat, feathers, manure and eggs. They provide a supplemental income to millions of small and marginal formers and also to the land less labourers in the rural pockets of this country. India has the second largest arable land base (159.7 million hectares) after US and largest gross irrigated area (88 million hectares) in the world, but the burgeoning human population with faster urbanization and high density animal population have squeezed the arable and pasture land. The cost of agriculture land is increased day by day, It is clear from the above discussion that the agricultural land in India is limited. There is, thus, an urgent need to evolve and adopt land-saving technologies. The global market for animal-based food has been expanding rapidly. This sector now holds good export potential as its exports exceeded total imports significantly. The situation turned around during the early 1990s due to increasing exports of meat and meat products and a significant decline in imports of milk and milk products. The process of trade liberalization and the efforts made by the government in recent times have certainly boosted the country's exports of livestock products to newer heights, which is visible from the increasing surplus of livestock trade earnings in recent years. A sustained rise in per capita income and urbanization is fuelling rapid growth in demand for animal food products. Demand for animal food products is income elastic and low-income households with a rise in their income will spend more on them. Though urbanization would continue to be the main driver of demand growth, rural areas will not lag. Besides, the world trade in livestock products has also been increasing fast, implying opportunities for increasing exports. Livestock production has been growing faster than crop production and the momentum is likely to continue. The demand-driven growth in livestock production will enable millions of poor to escape the poverty trap, as the distribution of livestock is more equitable as compared to land. The poor have sufficient labour of low opportunity cost and are capable of producing at a lower cost. A growing livestock sector will also contribute towards women empowerment. Market opportunities due to the anticipated rise in demand for livestock products will provide an avenue for resource-poor farmers to increase production, improve their livelihoods, reduce malnutrition and thereby, contribute to the goal of overall poverty alleviation. However, there is a need to provide an enabling environment in which small producers can take advantage of the opportunities, overcome the challenges and meet the threats. India has 6.4 lac villages and its 70 % of the population is living in rural areas out of this 25.7 % of total rural people come under below poverty line and poverty gap ratio in rural area is 5.05 % (Verma et al., 2020).

Mahatma Gandhi says "...India lives in her seven hundred thousand villages..."and the soul of India lives in her villages. So the empowerment of India depends mainly on empowerment of these villages (Ganesamurthy, 2007). There is need for good quality of life in these villages. For an Indian village, good quality of life means unhindered access to primary health care, primary and middle level education, a sustained income that meets every day needs and a satisfactory family, social and spiritual life (Pandey, 2002). Poverty has reduced considerably, from 35 % in 1994 to 22 % in 2012 (Narayan and Murgai, 2016). Most of Indian rural population depends in agriculture for their economic security. Chand et al. 2011 report that if agriculture were to be the sole source of livelihood, a majority of such households would have remained trapped in poverty. Backyard poultry keeping is practiced by majority of the poor and marginalized rural households all over India. These households rely on low cost backyard poultry rearing to supplement and enhance their livelihoods. It not only provides nutritional security but also reduces the livelihood vulnerability, and promotes gender equity (Dolberg, 2004, Ahuja, 2004; Ahuja and Sen, 2007). Although income in monetary terms from backyard poultry farming is negligible, female farmers continue to keep poultry for socio-cultural and religious reasons (Ahuja et al., 2008). For the past three decades focus has been on commercial poultry farming and India has without doubt made progress at an astounding pace reflected by being the fifth largest egg producer and eighteenth largest producer of broiler, (Mehta, 2002). However in this transformation from backyard poultry to commercial poultry farming, indigenous poultry have got neglected in favour of exotic poultry breeds that may have high production characteristics but also need high inputs both in feed and management, which are not necessarily suitable to the rural context or pro-poor (Pathan et al., 2009).

The general perception that indigenous birds are not an economically viable livelihood option is now being questioned by evidences available from various sources (Ahuja et al., 2008, Pathan et al., 2009). India has 20 recognized indigenous poultry breeds which have sustained so far through community efforts with very few, if any, external interventions. However, lack of animal health delivery system, disease outbreaks and increased consumption has led to decrease in indigenous poultry population from 50 % of total poultry population to 10 % within a span of 30 years (Rangnekar and Rangnekar, 1999).

Native chicken breed Kadaknath (Figure 1 and Figure 2) are gaining importance over the years due to their unique attributes. The original name of Kadaknath is "Kalamasi" meaning the fowl having black flesh. However this name is not as popular as the present name Kadaknath. It is an important indigenous breed of poultry inhabitating vast areas of Western Madhya Pradesh mainly the Jhabua and Dhar Districts and adjoining areas of Gujarat and Rajasthan (Sarma, 2021). The Kadaknath breed having fibromelanosis character commonly used both for meat and egg production in tribal and rural areas of India. The black flesh is very delicious, popular among tribal people and used for the treatment of many diseases by tribal, which needs proper scientific intervention (Thakur et al., 2006, Pathak et al., 2015). The meat of the Kadaknath breed contains high percentage (25.47 %) of protein and is believed to have aphrodisiac properties (Mohan et al., 2008). Unemployed youth and women can also earn an income through kadaknath farming. Kadaknath are well known for their tropical adaptability and disease resistance. The present review is to document the importance of Kadaknath chicken for rural economy.

Origin and Description of Indigenous Breed Kadaknath

Kadaknath breed is well adapted to the local environment and resistance to diseases compared with other exotic breeds of fowl in its natural habitat in free range and also resistant to extreme climatic conditions like summer heat and cold winter stress and can thrive very well under adverse environments like poor housing, poor management and poor feeding. Since a long time, Kadaknath breed of poultry was reared by tribes (Bhils, Bhillalas and others) and therefore through many generations of selection and fixation of genes some of the important breed characteristics had been established (Sarma, 2021). Kadaknath native to the state of Madhya Pradesh and the tribes of Bhil and Bhilala communities reared them for centuries. The specialty of the breed is the flesh and internal organs of this chicken are black in colour. So it is also called as Black Meat Chicken (BMC). It is also to be noted that it is the only black meat chicken breed of India. The black colour of muscles and tissues is due to the deposition of melanin pigment, a genetic condition called "Fibromelanosis" (Saxena, 2019). The kadaknath breed comes in three differently coloured feathers viz. Jet black, Pencilled and Golden Kadaknath. The Jet black adult males and females are black in colour, the Golden adult male and females were basically black in colour with Golden feathers on head and neck, whereas in Pencilled variety adult male and female plumage was black with white feathers on neck. In all the three varieties, skin, beak, shanks, toes and soles of males as well as females were dark grey colour, whereas tongue was dark gray or light black colour. Comb, Wattles and earlobes were light grey to dark grey coloured. However, in comb, Wattles and earlobes purple hue coloured was also observed. In all the three varieties of Kadaknath breed most of the internal organs exhibit intense black colouration which is due to the deposition of melanin pigment in the connective tissue of organs and in the dermis (Rao and Thomas, 1984). Kadaknath is a hardy breed and can thrive very well under adverse environments like poor housing, poor management and poor feeding. Kadaknath breed contains a high percentage of protein and believed to have aphrodisiac properties (Rao and Thomas, 1984). Kadaknath breed is poor in egg production potential, but their black flesh is very delicious and popular. Meat quality is highly appreciated for its distinctive taste, texture and flavour. Its flesh is of higher value and is being used for the treatment of many diseases in human beings by tribals living in Jhabua district of Madhya Pradesh. However, this needs proper scientific validation. In the whole region, Kadaknath birds are in great demand and are fetching good market price.

Nutritional Value of Kadaknath Meat and Egg

Kadaknath chicken meat is famous for its taste and claimed aphrodisiac and medicinal properties. The blood, meat and body of the birds are black, and compared with other poultry Kadaknath black meat has an intense and distinctive taste, and it contains more protein (Approx. 25 %) than white chicken meat (Approx. 18 %). Rich in vitamins B1, B2, B6, B12, C and E, (Mooventhan et. al., 2019) niacin, calcium, phosphorus and iron, the inky fowl has a lower fat content of only 0.73-1.03 % as opposed to the approx. 25 % in other chicken breeds (Sahu et al., 2019). Kadaknath meat contains 18 amino acids of which, eight are essential for the human body. Black meat is also considered healthier as it contains 24 % linoleic acid, as opposed to the 21 % in white chicken. Furthermore, the cholesterol content in Kadaknath is only 184.75 mg/100 gm as opposed to the 218.12 mg/100 gm level present in other chicken varieties. These attributes make Kadaknath meat and eggs highly desirable to the health conscious.

Table 1. Carcass characteristics of Kadaknath breed of chickens at 20 weeks of age (Ekka et. al., 2018).

Carcass Traits	Male	female	Overall
Live wt.gm	1249.33 ± 42.73a	936.33 ± 10.17b	1092.83 ± 72.69
Body wt %	96.31 ± 0.22	96.56 ± 0.69	96.43 ± 0.33
Dressed wt %	67.57 ± 1.41	67.38 ± 0.46	67.47 ± 0.67
Eviscerated wt %	66.21 ± 1.44	65.31 ± 0.70	65.76 ± 0.75
Giblet wt %	3.78 ± 0.05	4.36 ± 0.25	4.07 ± 0.17
Leg wt %	21.24 ± 0.4a	17.34 ± 1.94b	19.29 ± 1.02
Breast %	17.02 ± 0.19	16.73 ± 1.34	16.88 ± 0.61
Back + Neck wt. %	13.14 ± 0.07	12.14 ± 0.57	12.64 ± 0.34
Wing %	6.33 ± 0.14a	5.55 ± 0.22b	5.94 ± 0.21
Gizzard%	1.98 ± 0.00	2.27 ± 0.20	2.12 ± 0.11
Liver %	1.14 ± 0.06a	1.63 ± 0.04b	1.52 ± 0.06
Heart %	0.39 ± 0.01a	0.46 ± 0.00b	0.43 ± 0.02
Abdominal fat %	0.29 ± 0.03a	0.41 ± 0.02b	0.35 ± 0.03
Blood loss %	3.69 ± 0.22	3.44 ± 0.69	3.57 ± 0.33
Feather loss %	17.11 ± 1.06	18.97 ± 0.39	18.04 ± 0.66
Eviscerated loss %	11.63 ± 1.01	10.20 ± 0.24	10.91 ± 0.57
Total loss %	32.43 ± 1.67	32.62 ± 0.53	32.52 ± 0.80

Table 2. Chemical composition (on dry matter basis) of breast and thigh meat of Kadaknath male and female at 20 week of age (Ekka et al., 2018).

Parameters	Kadaknath Male		Kadaknath Female		Overall	
	Breast meat	Leg meat	Breast meat	Leg meat	Breast meat	Leg meat
Moisture %	75.38 ± 0.38	73.87 ± 0.59	75.50 ± 1.00	75.79 ± 0.99	74.86 ± 0.53	75.58 ± 0.48
Dry matter %	25.78 ± 0.17	24.63 ± 0.38	27.46 ± 0.40	24.21 ± 0.99	26.62 ± 0.42	24.21 ± 0.62
Crude protein %	87.50 ± 2.02	84.58 ± 1.54	84.58 ± 0.58	82.25 ± 2.02	86.04 ±1.14	83.42 ± 1.25
Ether extract %	3.50 ± 0.10	3.16b ± 0.12	3.65 ± 0.14	4.33a ± 0.19	3.58 ± 0.08	3.74 ± 0.28
Total ash %	4.99 ± 0.10	4.95b ± 0.06	5.20 ± 0.37	6.15a ± 0.15	5.09 ± 0.18	5.55 ± 0.28

Comparing Kadaknath with other poultry breeds in following table, comparative value of the Kadaknath breed both in terms of economics as well as nutritive values makes this breed more important among the poultry. Haunshi et al. 2013 reported that Kadaknath breed reached sexual maturity at an early age, and it had higher 40-wk egg production ($P < 0.001$). Parmar et al. 2003 reviewed egg quality of Kadaknath such as strong, medium and brittle shelled eggs were found to be 67.06 %, 30.74 % and 2.21 % respectively, dark brown shell

colour was most frequently (67.87 %) observed in eggs of Kadaknath birds followed by light brown colour (32.12 %), the mean shell thickness ranged from 0.29 to 0.32 mm with an average of 0.31 mm, the average mean egg weight was found to be 41.99 g with a range of 40.87 g to 42.86 g, the overall mean shape index was found to be 73.95, the overall average mean albumen index was found to be 7.03,the overall mean haugh unit was found to be 73.77, the overall mean yolk index was observed to be 37.07, the overall mean yolk weight was found to be 14.77 g, the overall mean albumen weight was found to be 20.74 g (Table 1).

This shows the egg traits of Kadaknath, which gives reason to farmer to adapt Kadaknath farming. Kadaknath has good growth performance. Ekka et al. 2018 reported that, body weights of males and females were 1249.33 ± 42.73 and 936.33 ± 10.17g, respectively (Table 1). Males were significantly (P0.05) difference between the two sexes. The percentage mean values of moisture, dry matter, crude protein did not differ significantly (P>0.01) whereas total ash % and ether extract % were 3.74 ± 0.28 and 5.55 ± 0.28, respectively which showed significant difference (P<0.01) in breast and leg muscle of males and females (Table 2).

Figure 1. Kadaknath Hen.

Figure 2. Kadaknath Chicken.

Production Performance

Kadaknath hens start laying eggs from 6 months onwards. Eggs are laid in two to three clutches in a year, with 25 to 30 eggs per clutch; thus, 80 to 90 eggs are produced annually. Hens of this breed show poor brooding ability and the eggs are, therefore, kept under others Deshi hens (Aseel, Chittagong, Busra, Brahma, Cochin, Araucana etc.) for hatching a traditional practice followed by tribal. Under natural setup, after the attainment of sexual maturity, a hen starts laying eggs which continues for a period of 15 to 20 days. After this the bird becomes broody and incubates the eggs for 21 to 26 days. After the hatching of chicks hen broods them for 35 to 70 days. This completes one laying cycle and then the birds enter next laying cycle. Each laying cycle comprise of 3 to 4 months duration, which results in 3 or 4 laying cycles per year. Although the birds lay eggs throughout the year but the frequency is extremely low during summer, particularly in the month of May and June. Even if eggs are laid, the hatchability was very poor (Mohan et al*.,* 2008). The 68 % farmers of India are marginal, small and semi medium with less than 4 acre land and 70 % of farmers are depends on agriculture but small agriculture land do not able to fulfill their economic requirements (F.A.O., 2017-18) Here native breed of poultry (Kadaknath, Aseel, Chittagong, Busra, Brahma, Cochin, Araucana etc.) comes as hope of light for marginal and small farmers and helps to fight poverty in India. The family poultry (chicken) husbandry support program was profitable for the beneficiary and contributed to the welfare of participants. Almost 90 % of all rural families keep a small number of native chickens and ducks under traditional free range semi-scavenging systems. Sarma (2021) reported that poultry are generally maintained by rural women and children that generate cash revenue and that supply adequate eggs and meat to their personal family's diet. Chickens generally scavenge around the homestead areas during day time, where they eat kitchen waste, left over cereal like rice, wheat, pulses, green grass, insects, and other available feed stuff. Village poultry makes a substantial contribution to household food security throughout the developing world. It helps to diversify income, provides high quality food and fertilizer, and acts as form of household savings and insurance. Kadaknath is one very valuable native poultry breed with good growth rate, egg quality, carcass quality and huge demand in market with remarkable high meat and egg price than other native and boiler breed of chicken. Kadaknath birds are well adapted to harsh environment of free range and they produce eggs and meat at least possible cost. Kadaknath required 1.5 sqft space per bird and easily rear in free range, backyard and semi intensive system.

CONCLUSION

Backyard poultry requiring hardly any infrastructure set-up is a potent tool for upliftment of the poorest of the poor. It has also been noticed that the demand for rural backyard poultry is quite high in tribal areas. Among the poor villagers, backyard poultry farming is an age-old practice where they keep mostly desi / indigenous birds which scavenge justin the backyard and nearby field with very little health care and management. It reduced migration from rural areas in off season and Kadaknath is working as Bank ATM for rural people. Due to rich source of nutrients, it helps diversification of Indian farming system and has vital role in the rural households as a source of high quality animal protein and emergency cash income and play a significant role in the socio -cultural life of the rural community. One of the most important positive characters of Kadaknath chicken is their hardiness, which is ability to tolerate the harsh environmental condition and poor husbandry practices without much loss in production.

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