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Farmers' Adoption Level of the Pratapdhan Breed in Backyard Poultry Farming in Udaipur District, Rajasthan, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Poultry farming is critical for the development of the economy. It usually has better returns than other livestock activities in developing countries. A study was done to assess the adoption of backyard poultry among 120 farmers in the Udaipur district of Rajasthan, concentrating on the Pratapdhan under AICRP. the study found that most farmers (64.17%) adopted practices to a medium level, with high (19.17%) and low (16.67%) adoption levels following. Adoption was highest

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in the practices of feeding and watering (96.92%), breeding (85.00%), housing (84.17%), and health care (70.42%). In general, adoption was at a medium level without considerable difference in Girwa and Gogunda tehsils ($Z = 0.427$, $p < 0.01$). From the results, it was found that a moderate level of adoption can be improved with further training, extension, and veterinary services. Market linkage building will aid in rural development through income diversification, transforming subsistence poultry farming into a commercial activity.

Keywords: AICRP; adoption level; backyard poultry; poultry farming; Pratapdhan breed.

1. INTRODUCTION

Poultry farming plays a vital role in national economic development. In developing countries, it is considered more profitable than other livestock ventures. Backyard poultry is an important source of supplementary nutrition security for a large number of poor households across the country. In the present scenario, rural poultry farming is contributing nearly 21 percent to the national egg production (Anonymous, 2010). India has one of the world's largest and fastest-growing poultry industries, ranking 3rd in egg production with an annual production of 122.11 billion eggs and 8th in poultry meat production (Anand, 2022). The demand for eggs and meat in rural areas is fulfilled by the rearing of backyard poultry (Panda *et al.,* 2008; Nath *et al.,* 2012). Backyard poultry farming, in particular, supports economic growth in rural areas by enhancing stakeholders' knowledge and attitudes. According to the 20th livestock census, India has a total poultry population of 851.80 million, comprising 534.74 million in commercial farming and 317.07 million in backyard farming, reflecting a 46% rise in backyard poultry (AICRP Annual Report 2021-22; BAHS, 2019).

Backyard poultry farming, usually involving flocks of 5 to 20 birds, primarily serves to meet household dietary needs and generate a small income. The All India Coordinated Research Project (AICRP) on Poultry Breeding at MPUAT, Udaipur, developed the Pratapdhan breed, a dual-purpose bird resembling native Rajasthan poultry. This breed, a cross of Mewari, coloured broiler, and Rhode Island Red, is favoured by farmers for its superior egg production (150-160 eggs annually) compared to indigenous breeds. Additionally, Pratapdhan birds exhibit higher body weights, with males ranging from 1.4 to 3 kg and females from 1.2 to 2.7 kg, making them suitable for small-scale poultry production (AICRP Annual Report 2021-22).

2. METHODOLOGY

The study was conducted in the Udaipur district of southern Rajasthan, focusing on Girwa and Gogunda tehsils, which had the highest number of Pratapdhan breed beneficiaries. Four villages—Dedkiya and Jawla from Girwa, and Hanyla and Vishma from Gogunda—were purposively selected based on beneficiary concentration. A total of 120 respondents were randomly selected, comprising 40 from Dedkiya, 36 each from Jawla and Hanyla, and 8 from Vishma. Data were gathered through personal interviews using a structured schedule aligned with the study objectives. Analysis was performed using statistical tools such as mean percent score and Z-test.

2.1 Adoption Level of Poultry Management Practices

An adoption index was developed to assess farmers' adoption of backyard poultry farming. Relevant statements were gathered from books, journals, and reviewed literature, then refined based on expert feedback. The adoption practices were categorized into five areas: housing, feeding and watering, breeds and breeding, management, and health care. Adoption levels were measured using a 3-point scale—full adoption (2), partial adoption (1), and no adoption (0). The adoption index was calculated for each practice, and the mean and standard deviation of the respondents' scores were used to classify them into low, medium, and high adoption categories. The formula used for calculating the adoption index is given below,

$$\text{Adoption Index} = \frac{\text{Total adoption scores actually obtained by the respondents}}{\text{Maximum possible attainable score}} \times 100$$

However, formulating the null hypothesis is necessary for the statistical test. A null hypothesis states that there is no relationship between the variables (Goode and Hatt, 1992). In this study, the following null hypotheses were formulated to examine the difference between the adoption levels of both the tehsils for poultry production.

Hypothesis:

(NH_0): There is no significant difference in the adoption level between Girwa and Gogunda tehsil respondents about the Pratapdhan breed under backyard poultry.

3. RESULTS

3.1 Distribution of Respondents According to Their Overall Extent of Adoption about Pratapdhan Breed under Backyard Poultry

Table 1, reveals that 64.17% of beneficiary farmers exhibited a medium level of adoption of the Pratapdhan breed in backyard poultry, while 19.17% had a high level and 16.67% had a low level of adoption. In Girwa tehsil, 59.21% of farmers showed a medium level of adoption, followed by 21.05% with high adoption and 19.74% with low adoption. In Gogunda tehsil, the majority, 72.73%, fell under the medium adoption category, whereas 15.91% had high adoption and 11.36% had low adoption levels. These findings align with those of Nath *et al.,* (2012), who reported that most respondents, 64.08%, had a medium level of adoption, followed by high, 19.02%, and low, 16.00% levels in poultry farming. A study found that the majority (65.43%) of the respondents had a medium level of adoption, followed by high (19.57%) and low (15.00%) levels of adoption (Kushwah *et al.,* 2016). Similar results were also observed by Meena et al., (2017).

3.2 Dimension Aspect-wise Extent of Adoption of Beneficiary Farmers about Pratapdhan Breed under Backyard Poultry

According to Table 2, marketing practices had the highest adoption rate among farmers at 96.92%, securing the I rank. This was followed by feeding and watering, adopted by 92.25% of farmers, ranked II. Breeds and breeding practices ranked III with an adoption rate of 85.00%, while housing was ranked IV at 84.17%. Health care practices had the lowest adoption rate of 70.42%, which was ranked V. Similar findings were found by of (Sasidhar *et al.,* 2008 and Khandait *et al.,* 2011).

3.2.1 Extent of adoption of housing for Pratapdhan breed under backyard poultry

The extent of adoption of various housing practices for the Pratapdhan breed in backyard poultry was assessed, and the mean percent score (MPS) for each practice was calculated to determine their ranking. Table 3 presents the findings, showing that “Use of feeder and waterer for feeding and watering” was ranked I with an MPS of 84.17. This was followed by “Provision of separate house” and “Provision of night shelter”, which were ranked II and III with 79.17 and 67.50 MPS, respectively. Among respondents in Girwa tehsil, the highest adoption was observed for “Use of feeder and waterer for feeding and watering” with 86.84 MPS, which was ranked I, followed by “Provision of separate house” and “Provision of night shelter” were ranked II and III, 77.63 and 63.16 MPS, respectively. In Gogunda tehsil, “Provision of separate house” was the most adopted practice with an MPS of 81.82, ranked I, followed by “Use of feeder and waterer for feeding and watering” and “Provision of night shelter” were ranked II and III, rank 79.55 and 75.00 MPS, respectively. The similar findings were also reported by (Nath *et al.,* 2012; Khandait *et al.,* 2011; and Bunkar, 2016).

3.2.2 Extent of adoption of feeding and watering for Pratapdhan breed under backyard poultry

The extent of adoption of feeding and watering practices among beneficiaries was analyzed, with mean percent scores (MPS) calculated to rank each practice. Table 4 presents the findings, indicating that “Use of kitchen waste” was the most widely adopted practice, securing the I rank with an MPS of 96.25. This was followed by “Frequency of feeding” and “Type of feed used in poultry,” ranked II and III with 80.21 and 78.54 MPS, respectively. In Girwa tehsil, “Use of kitchen waste” ranked I with an MPS of 96.71, while “Frequency of feeding” and “Type of feed used in poultry” followed II and III ranks with 81.25 and 79.61 MPS, respectively. Similarly, in Gogunda tehsil, “Use of kitchen waste” was the most adopted practice with an MPS of 95.45, ranked I. Followed by the practices “Frequency of feeding” and “Type of feed used in poultry” were ranked II and III with 78.14 and 76.70 MPS, respectively. under the type of feed used, the

majority of farmers preferred home-prepared feed, ranking I with 94.58 MPS, while market-purchased feed ranked II with 62.50 MPS. Regarding feeding frequency, the majority of farmers preferred feeding their birds twice a day, which ranked I with an MPS of 90.83, whereas feeding once a day ranked II with 70.83 MPS. Similar findings were obtained by (Mandal *et al.,* 2006; and Babu, 2013).

3.2.3 Extent of adoption of breeds and breeding & their management for

Table 5 presents data on the adoption of breeds and breeding practices in backyard poultry farming. The most widely adopted practice was the “Type of breeds adopted,” ranking I with an MPS of 85.00. This was followed by “Caring of broody hen” and “Source of chicks,” which were ranked II and III with 75.00 and 65.69 MPS, respectively. In Girwa tehsil, “Type of breeds adopted” was the most preferred practice, achieving an MPS of 85.86 was ranked I. Followed by “Caring of broody hen” and “Source of chicks” were ranked II and III with 75.00 and 66.23 MPS, respectively. Similarly, in Gogunda tehsil, “Type of breeds adopted” ranked I with 83.52 MPS, followed by “Caring of broody hen” and “Source of chicks” were ranked II and III with 75.00 and 69.51 MPS, respectively. Under sources of chicken, home hatching was the most common practice, with an MPS of 83.33 was ranked I, followed by purchasing from government or private hatcheries, and local markets were ranked II and III with 70.83 and 42.92 MPS, respectively. In terms of breed preference, improved backyard poultry breeds ranked I with 83.33 MPS, while desi breeds followed by II rank with 75.00 MPS. For broody hen care, natural brooding was the most adopted practice with 100 MPS, followed by predator protection at 50.00 MPS. In managing laying hens, frequent egg collection ranked I with 65.83 MPS, followed by the provision of laying boxes with dry bedding and egg storage at a consistent cool temperature were ranked II and III with 64.17 and 11.25 MPS, respectively. The findings are by the findings obtained by (Nandi *et al.,* 2007) and (Lenka and Behera, 2015).

3.2.4 Extent of adoption of health care management for Pratapdhan breed under backyard poultry

Table 6 shows that "Vaccination against diseases" was the most adopted health care practice by beneficiary farmers, ranking I with an MPS of 70.42. This was followed by "Cleanliness of poultry house" and "Treatment of birds," which were ranked II and III, with 66.67 and 57.08 MPS, respectively. In Girwa tehsil, "Vaccination against diseases" was ranked I with a MPS of 71.71, followed by "Cleanliness of poultry house" and "Treatment of birds" were ranked II and III with 68.42 and 57.68 MPS, respectively. In Gogunda tehsil, "Vaccination against diseases" was again the most adopted practice, with an MPS of 68.18, followed by "Cleanliness of poultry house" and "Treatment of birds," which were ranked II and III with 63.64 and 56.06 MPS, respectively. For bird treatment, most respondents with 97.08 MPS treated their birds themselves, ranked I, followed by “Treatment by local experts” and “veterinary doctors” ranked II and III, with MPS values of 60.00 and 14.17 MPS, respectively. Similar findings were also reported by (Nath *et al.,* 2012 and Lohakare *et al.*, 2015).

3.2.5 Extent of adoption of marketing for Pratapdhan breed under backyard poultry

Table 7, shows that the most widely adopted marketing practice among beneficiary farmers was "Care of backyard poultry taken by women and children," with an MPS of 92.92, ranking I. This was followed by "Time of selling" and "Appropriate marketing channel used for sale of eggs and birds," which were ranked II and III, with 76.46 and 65.00 MPS, respectively. In Girwa tehsil, "Care of backyard poultry taken by women and children" ranked I with an MPS of 92.11, followed by "Time of selling" and "Appropriate marketing channel used for sale of eggs and birds," which were ranked II and III, with 75.99 and 65.57 MPS, respectively. In Gogunda tehsil, "Care of backyard poultry taken by women and children" also ranked first with an MPS of 94.32, followed by "Time of selling" and "Appropriate marketing channel used for sale of eggs and birds," which were ranked II and III, with 77.27 and 64.02 MPS respectively. Under "Appropriate marketing channel used for sale of eggs and birds," most farmers 90.00 MPS used the 'Village market, ranked I, followed by 'Local shopkeeper' and 'Cooperative society', which were ranked II and III, with 80.00 and 25.00 MPS respectively. Regarding "Time of selling," most farmers with 92.92 MPS sold based on specific weight gain or age of the birds, were ranked I, followed by those “selling due to the requirement of money,” who were ranked II with 60.00 MPS. The findings are in line with the findings obtained by Panda *et al.,* (2008) and (Meena *et al.,* 2012).

Table 1. Distribution of respondents according to their overall extent of adoption about Pratapdhan breed under backyard poultry

S. No.	Adoption level	Girwa (n_1=76)		Gogunda (n_2=44)		Overall (n=120)	
		f	%	f	%	f	%
1	Low (< 39.06)	15	19.74	5	11.36	20	16.67
2	Medium (39.06 to 51.40)	45	59.21	32	72.73	77	64.17
3	High (>51.40)	16	21.05	7	15.91	23	19.17
Total		76	100	44	100	120	100

f= frequency, %= per cent

Table 2. Dimension aspect-wise extent of adoption of beneficiary farmers about Pratapdhan breed under backyard poultry

Sl. No.	Practices	Girwa (n_1=76)		Gogunda (n_2=44)		Overall (n=120)	
		MPS	Rank	MPS	Rank	MPS	Rank
1	Housing	86.84	I	79.55	II	84.17	IV
2	Feeding and watering	96.71	I	95.45	II	96.25	II
3	Breeds and breeding	85.86	I	83.52	II	85.00	III
4	Health care	71.71	I	68.18	II	70.42	V
5	Marketing	92.11	II	94.32	I	92.92	I

f= frequency, %= per cent

Table 3. Extent of adoption of housing for Pratapdhan breed under backyard poultry

S. No.	Practices	Girwa (n_1=76)		Gogunda (n_2=44)		Overall (n=120)	
		MPS	Rank	MPS	Rank	MPS	Rank
1	Provision of night shelter	63.16	III	75.00	III	67.50	III
2	Provision of separate house	77.63	II	81.82	I	79.17	II
3	Provide litter material in poultry house	50.00	IV	68.18	IV	56.67	IV
4	Use feeder & waterer for feeding and watering	86.84	I	79.55	II	84.17	I
5	Temperature & ventilation arrangement in poultry shelters	46.05	V	45.45	V	45.00	V

MPS= Mean percent score

Table 4. Extent of adoption of feeding and watering for Pratapdhan breed under backyard poultry

S.No.	Practices	Girwa (n_1=76)		Gogunda (n_2=44)		Overall (n=120)	
		MPS	Rank	MPS	Rank	MPS	Rank
1	Scavenging availability	**57.89**	**IV**	**53.41**	**IV**	**56.25**	**IV**
2	Use of kitchen waste	**96.71**	**I**	**95.45**	**I**	**96.25**	**I**
3	Type of feed used in poultry	**79.61**	**III**	**76.70**	**III**	**78.54**	**III**
	1. Home prepared	96.05	I	92.05	I	94.58	I
	2. Purchased from market	63.16	II	61.36	II	62.50	II
4	Frequency of feeding	**81.25**	**II**	**78.14**	**II**	**80.21**	**II**
	1. Single time	71.05	II	70.45	II	70.83	II
	2. Double time	92.11	I	88.64	I	90.83	I

MPS= Mean percent score

Table 5. Extent of adoption of breeds and breeding & their management for Pratapdhan breed under backyard poultry

S. No.	Breeds and breeding & their management	Girwa (n_1=76)		Gogunda (n_2=44)		Overall (n=120)	
		MPS	Rank	MPS	Rank	MPS	Rank
1	Source of chicks	**66.23**	**III**	**69.51**	**III**	**65.69**	**III**
	(a) Hatching at home	86.18	I	78.41	I	83.33	I
	(b) Purchased from local market	42.11	III	44.32	III	42.92	III
	(c) Purchased from Govt. /private hatchery	70.39	II	71.59	II	70.83	II
2	Type of breed adopted in backyard poultry	**85.86**	**I**	**83.52**	**I**	**85.00**	**I**
	(a) Deshi	79.61	II	72.73	II	77.08	II
	(b) Improved backyard poultry breeds	92.11	I	94.32	I	92.92	I
3	Caring of broody hen	**75.00**	**II**	**75.00**	**II**	**75.00**	**II**
	1. Brooding of chicks naturally	100	I	100	I	100	I
	2. Care from predators	50.00	II	50.00	II	50.00	II
4	Caring of laying hen used in poultry	**47.37**	**IV**	**46.59**	**IV**	**47.08**	**IV**
	(a) Provision of laying box with dry bedding	65.13	II	62.50	II	64.17	II
	(b) Frequently collection of eggs	65.79	I	65.91	I	65.83	I
	(c) Storage of egg at uniform cool temperature	11.18	III	11.36	III	11.25	III

MPS= Mean percent score

Table 6. Extent of adoption of health care management for Pratapdhan breed under backyard poultry

S. No.	Health care management	Girwa (n_1=76)		Gogunda (n_2=44)		Overall (n=120)	
		MPS	Rank	MPS	Rank	MPS	Rank
1	Vaccination against diseases	**71.71**	**I**	**68.18**	**I**	**70.42**	**I**
2	Treatment of birds	**57.68**	**III**	**56.06**	**III**	**57.08**	**III**
	(a) Self	98.03	I	95.45	I	97.08	I
	(b) Local expert	61.84	II	56.82	II	60.00	II
	(c) Veterinary doctor	13.16	III	15.91	III	14.17	III
3	Cleanliness of poultry house	**68.42**	**II**	**63.64**	**II**	**66.67**	**II**

MPS= Mean percent score

Table 7. Extent of adoption of marketing for Pratapdhan breed under backyard poultry

S. No.	Marketing	Girwa (n_1=76)		Gogunda (n_2=44)		Overall (n=120)	
		MPS	Rank	MPS	Rank	MPS	Rank
1	Marketing channel used for sale of eggs and birds	**65.57**	**III**	**64.02**	**III**	**65.00**	**III**
	(a) Village market	90.13	I	89.77	I	90.00	I
	(b) Local shopkeeper	81.58	II	77.27	II	80.00	II
	(c) Cooperative society	25.00	III	25.00	III	25.00	III
2	Time of selling	**75.99**	**II**	**77.27**	**II**	**76.46**	**II**
	(a) Specific wt. gain/ age of birds	92.11	I	94.32	I	92.92	I

S. No.	Marketing	Girwa (n_1=76)		Gogunda (n_2=44)		Overall (n=120)	
		MPS	Rank	MPS	Rank	MPS	Rank
	(b) Requirement of money	59.87	II	60.23	II	60.00	II
3	Use manure for agriculture production	**54.61**	**IV**	**48.86**	**IV**	**52.50**	**IV**
4	Care of backyard poultry taken by women and children	**92.11**	**I**	**94.32**	**I**	**92.92**	**I**

MPS= Mean percent score

Table 8. Comparison of extent of adoption between Girwa and Gogunda tehsil regarding Pratapdhan breed under backyard poultry

S. No.	Category of sample	Mean	Var.	'Z' Value
1.	Girwa tehsil respondents	45.41	43.47	**0.427^{NS}**
2.	Gogunda tehsil respondents	44.93	29.41	

NS= Non-significant

3.2.6 Comparison of extent of adoption between Girwa and Gogunda tehsil regarding Pratapdhan breed under backyard poultry

To assess the differences in the adoption of the Pratapdhan breed between Girwa and Gogunda tehsils, a Z-test was conducted. The calculated Z value of 0.427 was found to be less than the tabulated value, indicating no statistically significant difference. Therefore, the null hypothesis (NH_0) was accepted, concluding that there was no significant difference in the adoption extent of the Pratapdhan breed between the two tehsils (Samantaray et al., 2020).

4. CONCLUSION

The study focused on the Pratapdhan breed of poultry, which was accepted by most of the farmers, but the recommended practices for its rearing were only moderately adopted. Adoption was highest in areas such as marketing, feeding, and breeding, while housing and healthcare lagged behind. This suggests there is room for improvement toward adopting a holistic approach. Backyard poultry farming can be enhanced through specialized training and field extension activities. Focused advocacy will be the immediate need for promoting improved breeds, augmenting veterinary services, and establishing strong market linkages. Targeting women and youth, backed by transformative government and institutional policies, could harness the potential of backyard poultry farming as a reliable source of nutrition, income, and rural development."

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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