Original Research Article

Constraints to Integrated Farming System in Hadoti region of Rajasthan, India

ABSTRACT

The study's major goal was to find out the challenges that farmers face in the integrated farming system. Farmers' constraints in different enterprises of the integrated farming system were recorded through a well-structured and pretested survey schedule. To confirm their validity and determine the extent to which the identified constraints were seen in crop production as well as in cattle production, goat rearing, backyard poultry production and orange cultivation, the severity of the indicated constraints in the real field condition was measured. The fieldwork was carried out in sixteen villages of the Hadoti region (Kota, Bundi, Baran, and Jhalawar) that were randomly chosen. A total of 112 farmers were interviewed and data was gathered through group discussions and personal interviews. The data were quantified by first ranking the limitations based on the responses of the respondents.

KEYWORDS: IFS, Agriculture, Constraints, Farmer, Hadoti region.

1. INTRODUCTION

Agriculture has been recognized as the basis of India's economy. In the last two years, the agriculture sector has experienced strong growth. The industry, which employs the biggest number of people, contributed 18.8% of the country's Gross Value Added (GVA) in 2021-22, with a growth of 3.6 percent in 2020-21 and 3.9 percent in 2021-22 (Ministry of Economic Affairs, 2022). Integrated Farming Systems (IFS) are interdependent, interconnected, and often interlocking production systems centered on a few crops, animals, and related subsidiary enterprises that maximize nutrient usage while minimizing the negative impact of these operations on the environment. Adoption of different agricultural system approaches fits nicely into the varied agriculture funnel. Crops, cattle, poultry, fish, sericulture, vermicompost, piggery, dairy, goats, and horticulture are all part of the farming system (Yadav et al., 2020). Integrated Farming Systems (IFS) is a well-recognized good technique for coordinating cooperative management of land, water, plants, livestock, and people (De, L. C. et al. 2021). Animal husbandry, dairying, and fishing are among the allied industries that are progressively expanding as high-growth sectors. Over the five years ending in 2019-20, the cattle sector grew at an annual rate of 8.15 percent. The integration on the farm is not so easy. Day by day the landholding size per capita is decreasing and the population is increasing geometrically. On the given account of landholding earning or at least producing for a good standard of living with limited use of resources is the main challenge for today's era. There are various areas in agriculture that could have been exploited to increase farmers' income like improvement in productivity, increasing cropping intensity, diversification towards high value crops, etc (Gautam and Singh, 2020). For achieving this we need to move toward an integrated farming system with more diversification in the enterprises. Different enterprises used in the integrated farming system were divided upon their importance and constraints faced by farmers. Crop cultivation was divided into production and marketing-related constraints where the cattle and goat rearing were divided upon breeding, feeding, marketing, and other constraints. Cattle and goats reared by farmers' have the same hurdles relatively so here in this study they were used combined in the aspect of constraints faced by the farmers. Backyard poultry and orange crop production also have their constraints which were divided upon that.

2. Methodology

Constraints are described as a scenario or set of circumstances that constraint or limit specific manufacturing or marketing or producing activity or performance in any activity. A total of eight combinations (Table: 1) of IFS from different enterprises *i.e.* crop, cattle, goat, backyard poultry, and orange were included in the study. Further a list of farmers' was made to find out the farmers doing integrated farming system and from that 5 percent of the total population from each village was taken out for a personal interview. Interviewing the appropriate respondents and recording their observations on a well-structured survey schedule were used to identify the restrictions.

Table :1 Different combinations of enterprises in IFS

S. No.	Combinations of different enterprises in IFS
1	Crop + Cattle
2	Crop + Goat + Backyard Poultry
3	Crop + Goat + Cattle + Backyard Poultry
4	Crop + Goat + Cattle
5	Crop + Goat + Orange
6	Crop + Cattle + Orange
7	Crop + Cattle + Goat + Orange + Backyard Poultry
8	Crop + Goat + Orange + Backyard poultry

2.1 Garret ranking analysis

Garrett's ranking technique was used to determine the key restrictions faced by farmers in different enterprises included in the integrated farming system. This method was used to rank in terms of production problem, marketing problem, breeding problem in goat and cattle, feeding problems, price of chicks, non-availability of rootstocks, etc. This method aids in determining the most critical constraints that respondents experience in order of importance. Respondents were asked to list and assign ranks to various difficulties using Garrett's ranking technique, which was then utilised to prioritise restrictions. Individual constraints will be ranked by Garret's ranking technique using the formula:

$$\text{Percent position} = \frac{100(R_{ij}-0.5)}{N_j}$$

Where,

R_{ij}=Rank given for i^{th} constraints by j^{th} individual

N_j= Number of constraints ranked by the j^{th} individual.

After getting the percent position rank was converted to scores according to Garret and Woodworth's tables (1969). The scores of each respondent were then added together for each factor and divided by the total number of respondents for whom scores were collected. All of the factors' mean scores were ranked. (Vijayasarathy & Ashok, 2015); (S. Kumar & Sidana, 2018) .

3. RESULTS AND DISCUSSION

The enterprises used in different combinations of IFS are studied one by one and then ranked according to the score. The findings are divided according to different enterprises included in IFS: (i) crop cultivation, (ii) livestock (cattle + goat), (iii) backyard poultry, and (iv) orange cultivation.

(i) Constraints faced by farmers in crop cultivation

Among the various constraints faced by the farmers' in different crop cultivation in the hadoti region divided into two parts production-related constraints and marketing of the output-related constraints. The low price of output was at first rank. It means the farmers face a lot due to this problem. The mean score (58.75) was the highest for the high cost of inputs. A similar study done by NABARD found that the majority of farmers' do not receive remunerative pricing, resulting in a decreased value of their output. Farmers' are unable to obtain the MSP (minimum support price) due to the monopolistic behavior of informal buyers/traders who acquire agricultural produce at a lower price than the marketplace. Another major constraint found was the storage facility to the study area. The mean score for the storage facility was 53.48. This is also a constraint for other

southern districts of Rajasthan found in another related study (Singh & Burark, 2016). High cost of inputs and unavailability of quality seeds were third and fourth constraints faced by the farmers in the study area with a mean score of 52.85 and 48.76 respectively. Unavailability of inputs on time, unavailability of labour, natural calamities, transportation problem, and attack of pests to different crops was the constraints from higher to lower priority which plays a vital role to affect the crop cultivation were listed in Table-2.

Lack of market information and lack of regulated market were found as less prioritized constraints which were listed in the table-1. Markets were found developing as ranked by farmers' but not getting the higher price of output. The same constraints were found in a study that clarifies that marketing constraints such as price fluctuation, late payment for products, and lack of storage facilities were the main constraints found in the marketing of produce (Meshram, M et. al., 2020). The higher price of output is not received by the farmers, due to a lot of middlemen, other paper formalities, and the need for money instantly.

Table 2: Different constraints faced by farmers in crop cultivation

S.N.	Constraints	Garret Mean Score	Rank	Overall rank
Production problem				
1.	Financial problem	46.24	VIII	X
2.	High cost of inputs	52.85	I	III
3.	Attack of pest	46.96	VI	IX
4.	Natural calamities	47.28	V	VII
5.	Unavailability of inputs on time	48.58	III	V
6.	Unavailability labour	48.29	IV	VI
7.	Unavailability of quality seeds	48.76	II	IV
Marketing problems				
1.	Low price of output	58.75	I	I
2.	Lack of storage facilities	53.48	II	II
3.	Transportation problem	47.14	III	VIII
4.	Lack of regulated market	45.53	IV	XI
5.	Lack of market information	44.95	V	XII

(ii) Constraints faced by farmers in livestock (cattle + goat) production

Constraints related to livestock production are presented in table-3. All constraints related to livestock production are further divided into mainly three subdivisions. Farmers' were faced different problems related to production, feeding, and marketing. In livestock, production farmers faced a lot due to veterinary services. It was also found that veterinary services are not available at door. If any farmer needs the services they need to take the cattle or goat to the hospital which increases the veterinary cost (transportation charges). A study also revealed the same results that the selected zone felt the lack of doorstep availability of veterinary services (R. Kumar et al., 2020). The high cost of feeds and fodder was also found as a constraint to the farmers of the study area. It was found that feeding and fodder costs were high in Maharashtra (Nagrale et al., 2015). Lack of A.I. facility, inadequate knowledge about balanced feeding, Problems of heat detection and Inadequate green fodder, Inadequate dry fodder, and Inadequate Concentrate were also found as a problem to the farmers' from higher to less prioritise as a constraint. Similar findings are also found in different studies (Nagrale et al., 2015; Yadav et al., 2020). Other similar findings are Patil et al. (2009) and Sonpasare et al. (2011), who found that the lack of green fodder is a major constraint. Higher cost of concentrates, as well as non-availability of green fodder, was identified as major feeding constraints by Shishode et al. (2009). Rathod et al. (2009) identified non availability of fodder throughout the year as a major feeding constraint.

Lack of organized marketing facility for selling the milk or live sell in case of goat, lower conception rate through A.I., Non-availability for fodder cultivation, and Repeat breeding were found

as less prioritized constraints which were listed in the table-2. fodder-related constraints are major in the findings.

Table 3: Different constraints faced by farmers in livestock (cattle + goat) production

S.N.	Constraints	Garret Mean score	Rank	Overall rank
Production problem				
1.	Lack of A.I. facility	50.49	II	III
2.	Repeat breeding	46.87	V	XI
3.	Poor veterinary services	54.51	I	I
4.	Problems of heat detection	49.42	III	VI
5.	Lower conception rate through A.I.	48.79	IV	IX
Feeding problems				
1.	Inadequate GF Inadequate DF Inadequate Concentrate	49.42	III	VII
2.	High cost of feeds and fodders	53.93	I	II
3.	Inadequate knowledge about balanced feeding	50.21	II	V
4.	Non-availability for fodder cultivation	47.04	IV	X
Marketing problems				
1.	Low price of milk	50.46	I	IV
2.	Lack of organized marketing facility for milk or live sell	49.30	II	VIII

(iii) Constraints faced by farmers in backyard poultry production

Constraints faced by farmers' in backyard poultry production in the study area are presented in table 4. Main constraint faced by the farmers from the study area such as an attack of predators with a 51.10 mean. Similar findings were concluded by (Lal et al., 2021). The majority of the farmers only had temporary poultry buildings designed out of locally accessible materials like bamboo and wood. Due to not having proper shelter for poultry, they face the problem. Non-availability of improved chicken varieties was the second major constraint ranked by the farmers'. In this contrast better to say improved chicks variety not available at low prices or suitable prices to farmers according to the perception of the farmer of the study area. These findings are supported by similar findings of (Sihag et al., 2021). In backyard poultry incidence of several diseases is also a constraint with the lack of veterinary and medical facilities. These problems are correlated with each other. Due to a lack of medicinal and vaccination facilities, farmers faced the problem of the high incidence of diseases. The farmers of the study area also have a lack of knowledge about finding the disease in the poultry. They also suffer due to this factor also that's why the diseases come easily and which cause a heavy loss in the form of mortality.

Lacks of technical advice and non-availability of labour are found less prior constraints as compared to others. Facing the non-remunerative price of both eggs and birds is found a major hurdle in the marketing-related practices. By this, the farmers' do have not more income as expected according to them. In this regard, most of the households are using kitchen waste so might be from this practice the health of the birds is not so good. If they want a better price they need to move for better feed. This constraint is self-explained when the farmers ask about the cost of feed. They give this a lesser priority as a constraint.

Table 4: Different constraints faced by farmers in backyard poultry production

S.N.	Constraints	Garret Mean score	Rank	Overall Rank
Production problem				
1.	Lack of knowledge about the disease	49.79	V	V

2.	High incidence of disease	50.43	III	III
3.	Lack of Veterinary or medicinal and vaccination facilities	50.40	IV	IV
4.	Attack of predators	51.10	I	I
5.	Lack of technical advice	49.69	VI	VI
6.	Non-availability of labour	49.38	VII	VII
7.	Non-availability of improved chicken varieties	51.00	II	II
8.	High feed cost	46.50	VIII	X
Marketing problem				
1.	Non-remunerative price of eggs	48.34	II	IX
2.	Non-remunerative price of birds	48.89	I	VIII

(iv) Constraints faced by farmers in orange cultivation

There are several constraints faced in orange cultivation by the farmer in the study area. These constraints are divided into two subdivisions production-related and marketing-related. The five- five different components of production and marketing-related constraints have been identified in the study area. The response of orange cultivation constraints is presented in the table-5. Lack of disease-free rootstock or good quality of planting material is found a major constraint in this regard. A pest attack on one farming system impeded the production process of the other farming system, it was discovered (Buragohain et al., 2019). The second major constraint found is low productivity according to the farmer. Both constraints were found interrelated due to not using a good rootstock they might be got lower productivity from the farm. These results are supported in a finding that the majority of orange growers were found to be dealing with excessive rootstock costs and a lack of disease-free rootstock with having a problem of rootstock not being available in a big number (Deshmukh et al., 2021). Scarcity of labour is another factor faced by the farmer in the production of orange in the study area. Further, the lack of transportation facilities and high incidence of disease and pests were found a major constraint that plays a vital role in affecting the income of a farmer in the study area. The transportation cost increases the total cost of the grower. Due to several diseases, the production per hectare also goes below. This is also a reason for low productivity in orange cultivation.

Lack of storage facilities and lack of processing facilities are the major two constraints that affect the marketing of orange. These findings are supported by a study that most of the farmers want to place a processing unit nearby the villages (Bhat et al., 2015). So it is recommended that the training and campaign-related to processing of orange are much needed to arrange by which more of the population got employment and get a better income. Lack of knowledge about recommended package and practices and marketing information also found as a constraint but less prior as compared to processing and storage constraints. Irrigation facilities are lesser prior constraints found in the study area. This means irrigation facilities are in a good condition in the study area.

Table 5: Different constraints faced by farmers in orange cultivation

S.N.	Constraints	Garret Mean Score	Rank	Overall Rank
Production problem				
1.	Low Productivity	52.38	II	II
2.	Lack of disease-free rootstock or good quality of planting material	52.59	I	I
3.	Hi-incidence of disease & pest	51.17	IV	V
4.	Scarcity of labour	52.32	III	III
5.	Uncertainty of electric supply affect the irrigation	48.05	V	X
Marketing Problem				
1.	Lack of processing facilities	50.27	III	VII
2.	Lack of storage facilities	50.71	II	VI

3.	Lack of transportation	51.72	I	IV
4.	Lack of knowledge about recommended packages and practices	49.10	V	IX
5.	Lack of marketing information	49.51	IV	VIII

Government initiatives and recommended mitigation measures

NMSA (National Mission on Sustainable Agriculture) initiative taken by the government of India that focuses on conservation agriculture to make the farm sector more productive, sustainable, profitable, and climate-resilient by promoting location-specific integrated farming systems, soil and moisture conservation measures, comprehensive soil health management, and mainstreaming rainfed technologies. The MSPs for all mandatory crops for Rabi and Kharif Marketing Season every year were also issued by the government. The government has set a relatively higher MSP in 2021-22 for pulses and oilseeds to meet nutritional needs, change eating patterns, and attain self-sufficiency in pulses and oilseeds production. Since off-farm income and diversification activities have risk hedging or risk coping motives rather than profit-maximizing motives, these might be viewed as suboptimal behavior. Farmers might choose less profitable and less risky enterprises instead of high-yielding risky enterprises. Adequate institutional and enabling rural development agencies' support for promoting IFS are important considerations. Need to participate the farmer in designing, evaluating, and refinement of farming systems research for the adoption of IFS.

4. CONCLUSION

Horticulture and Livestock based farming systems are more popular interventions among most farmers. In the existing farming system practiced by farmers in the region, there are always integrations at various levels. Incorporating scientific approaches such as integrated precision farming into the management of different components will not only improve resource use efficiency in existing production systems but will also help to move farmers closer to sustainability in the future by mitigating negative environmental effects through proper nutrient recycling. It is possible to conclude that farmers are confronted with several issues in IFS. To take advantage of promising agricultural production opportunities, a coordinated effort and effective feedback mechanism between many stakeholders in the agriculture production system are now required.

REFERENCES

Bhat, A., Kachroo, J., Sharma, M., and Peshin, R. (2015). Constraints in Production and Marketing of Citrus Fruit in Jammu region of J&K State, *Economic Affairs*, *60*(2), 331.

Buragohain, D., Borua, S., and Barman, U. (2019). Status and Scope of Integrated Farming System (IFS) in Upper Brahmaputra Valley Zone of Assam, *Indian Journal of Extension Education*, 55(2), 95-100.

De, L. C., De, T., Biswas, S. S., and Kalaivanan, N. S. (2021). Organic plant nutrient, protection, and production management. *Book chapter in Advances in Organic Farming* (pp 115-131).

Deshmukh, A., Agrawal, S., and Jallaraph, V. (2021). Constraints Faced by Orange Growers about Production and Marketing Orange. *International Journal of Agriculture Environment and Biotechnology*, 14(1), 11–16.

Dhaka, S.R. and B.L. Dhaka (2017). Analysis of productivity constraints faced by farmers in Tonk district of Rajasthan. *International Journal of Science, Environment and Technology*, 5(2), 799-805.

Garrett, H.E. and Woodworth R.S. (1969) Statistics in psychology and education. Bombay: Vakils, Feffer & Simons Pvt. Ltd.

Gautam, Y. and Singh, O. P. (2020). Empirical analysis of economic viability and cost of installation of 3 HP solar irrigation pump in Jaipur, Rajasthan. *Asian Journal of Agricultural Extension, Economics & Sociology*. 38(12). 60-67

Kumar, R., Singh, B. P., Maousami, V. K., and Bharti, P. K. (2020). Author Scientific Health

Technologies 16 Users Online Keywords : Constraints Economic Input Institutional Social Technological. *International Journal of Livestock Research*, *7*(6), 238–244.

Kumar, S., and Sidana, B. K. (2018). Farmers' perceptions and adaptation strategies to climate change in Punjab agriculture. *Article in Indian Journal of Agricultural Sciences*, *88*(10), 93–101.

Lal, S. V., Laxmi, N. A., Kapoor, P., and Jerard, A. (2021). Comparative Study on the Knowledge Level and Constraints Faced by the Backyard Poultry Farmers of Two Villages in Andaman and Nicobar Islands. *International Journal of Science and Research (IJSR)*, 10(2), 1139–1143.

Meshram, M., Khare, N. K., Singh, S. R. K., and Sharma, H. L. (2020). Constraints faced by tribal farmers apropos integrated farming system (IFS) in Madhya Pradesh: A statistical analysis. *Indian Journal of Extension Education*, 56(1), 181-185.

Ministry of economic affairs. (2022). Government of India. *Economic Survey*, *January* 2022.

Nagrale, B. G., Datta, K. K., and Chauhan, A. K. (2015). An analysis of constraints faced by dairy farmers in Vidarbha region of Maharashtra. Indian Journal of Dairy Science, 68(4), 390–394.

Patil A.P., Gawande S.H., Nande M.P. and Gobade M.R. (2009) Constraints faced by the dairy farmers in Nagpur district while adopting animal management practices. Veterinary World 2(3), 111-112.

Rathod P.K., Landge S., Nikam T.R. and Vajreshwari S. (2009) Socio-personal profile and constraints of dairy farmers. Karnataka Journal of Agricultural Sciences 24(4), 619-621.

Shishode M.G., Dhumal M. V., Siddiqui M.F., Kulkarni M.D., Ulemale A.H., Khanvilkar A.V., Siddiqui M.B.A., Samant S.R. and Komatwar S.J. (2009) Evaluation of constraints faced by farmers in adoption of dairy cattle managemental practices. Indian Journal of Field Veterinarian 5(1), 25-26.

Sihag, P., Sharma, K. C., Sharma, R. A., and Yadav, S. (2021). Housing practices ranked at top in backyard poultry farming by the beneficiaries in Rajasthan. *Journal of Krishi Vigyan*, 9(2), 76–81.

Singh, H., and Burark, S. S. (2016). Constraints faced by the households in Existing Farming Systems in Chittorgarh and Banswara districts of Southern Rajasthan. *Advances in Social Research*, 2(1), 71–76.

Sonpasare I. P., Hembade A. S., and Gaikwad S. M. (2011) Studies on Prospects and Constraints of Dairying in Chikhali. Journal of Dairying, Food and Home Sciences 30(2), 115-116.

Vijayasarathy, K., and Ashok, K. R. (2015). Climate Adaptation in Agriculture through Technological Option: Determinants and Impact on Efficiency of Productions. *Agricultural Economics Research Review*, 28(1), 103–116.

Yadav, L. C., Shekhawat, P. S., and Jain, S. (2020). Analysis of Constraints Faced by Farmers in Prevailing Farming Systems in Jaipur District of Rajasthan, India. *International Journal of Current Microbiology and Applied Sciences*, 9(11), 3646–3652.