Research Tool

Indian Journal of Extension Education
Vol. 59, No. 4 (October–December), 2023, (141-144)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Assessing Organic Poultry Farming Knowledge Among Tribal Farmers: A Tailored Knowledge Test

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ARTICLE INFO

Keywords: Design, Evaluation, Knowledge assessment test, Organic poultry farming, Tribal farmers

http://doi.org/10.48165/IJEE.2023.59428

Conflict of Interest: None

Research ethics statement(s): Informed consent of the participants

ABSTRACT

The increasing demand for organic agricultural products necessitates the assessment of farmers' knowledge levels, particularly among tribal communities engaged in organic poultry farming. This manuscript presents the construction and development of a knowledge test specifically designed for tribal farmers in India who have undergone training in organic poultry farming. The test aims to evaluate their understanding of organic farming principles, best practices, disease management, and other relevant aspects. A total of 56 items were selected, and their difficulty and discrimination indices were calculated using item analysis. The final selection of items for the test was based on criteria of difficulty and discrimination indices. The reliability of the test was assessed using the split-half method, yielding a correlation coefficient of 0.82. The validity of the test was established through point-biserial correlation analysis. The developed knowledge test provides a valuable tool for evaluating the productivity of training programmes and identifying areas for further support and improvement in organic poultry farming among tribal farmers.

INTRODUCTION

Knowledge tests have a crucial role in evaluating the skills and competencies of individuals in our rapidly changing world (Vijyan et al., 2022). The poultry industry provides job opportunities and boosts household income in rural communities (Patel et al., 2022; Jat & Yadav, 2022).Across the world, in countries like the USA there has been 25 per cent growth rate in the poultry industry and in United Kingdom there is a 100 per cent increase in organic poultry meat (Willer et al., 2022; Willer et al., 2023). The global demand for a more sustainable approach to farming has led to the rise of the organic agriculture movement, which has gained traction among farmers, including tribal farmers in India (Gills et al., 2020). The expansion of organic farming has been witnessed globally, with increasing areas under organic management and a wide range of organic food products (Nain et al., 2020), with the international market for organic food & drink expanded by 5 per cent to 135.5 billion US dollars in 2021 (Willer et al., 2023). In India, organic farming is gaining momentum, particularly among small and marginal farmers in rain-fed, arid, and hilly regions (Subrahmanyeswari & Chander, 2022). Tribal farmers, who constitute a significant portion of the agricultural community in India, face challenges such as limited resources, inadequate technical knowledge, and lower socio-economic status (Pawluk et al., 1992; Singh et al., 2022; Sajeev et al., 2021). Implementing training initiatives aims to promote sustainable and organic farming practices among tribal farmers, particularly in free-range poultry rearing, which holds the potential for income generation, women's empowerment, and improved nutrition (Chaturvedani et al., 2017; Singh et al., 2017). Knowledge of many of the critical technical know-how which is a prerequisite for practicing organic farming (Malik et al., 2022). However, existing assessment tools may not adequately capture the specific knowledge requirements and cultural

Received 26-07-2023; Accepted 11-09-2023

context of tribal farmers engaged in organic poultry farming. This research aims to develop a tailored knowledge test for tribal farmers in India who have received training on organic poultry farming, taking into consideration their unique needs and cultural background.

METHODOLOGY

The knowledge assessment focused on evaluating the understanding and critical thinking abilities of tribal farmers engaged in organic poultry production, specifically in India. The assessment was meticulously designed to align with the core concepts of organic farming and utilised questions, referred to as "items," sourced from the National Programme for Organic Production (NPOP) standards (APEDA, 2014). The selection of these items adhered to two primary criteria. Firstly, the questions aimed to foster thoughtful comprehension rather than relying solely on rote memorisation, encouraging farmers to apply their knowledge and analytical skills in practical scenarios. Secondly, the items were carefully tailored to differentiate between farmers who possessed sound knowledge and those who lacked expertise, effectively gauging their level of proficiency. Each item was assigned a difficulty value to ensure an appropriate level of challenge. To ensure the test's validity, items that were either poorly understood by farmers or elicited unanimous correct or incorrect responses were deemed unsuitable. Initially, a total of 56 items were selected, encompassing key aspects of the organic poultry production curriculum. Subsequently, a schedule was devised to execute the test to a comparable target group of farmers. The motive of administering them was to conduct item analysis, evaluate the relevance of each item, and identify any weak or non-applicable questions. The items were presented in diverse formats, such as multiple-choice or other open-ended formats, to accommodate different perspectives and provide a comprehensive assessment of farmers' knowledge and understanding of organic poultry production.

The items were distributed to 30 tribal farmers who had received training inorganic farming. After computing the scores obtained by the respondents, the scores were arranged in descending order. The respondents were then divided into six equal groups, each consisting of five respondents, and sorted based on their total scores. These groups were named G1, G2, G3, G4, G5, and G6, respectively. The middle two groups (G3 and G4) were excluded from the analysis because test items were to be analysed. Only the four groups with high and low scores were considered for calculating item difficulty and item discrimination indices The range of scores (out of a maximum of 56) obtained by the respondents in the six groups were analysed and were later grouped as follows:

G1 = 52 to 56	G4 = 29 to 33
G2 = 44 to 51	G5 = 27 to 28
G3 = 34 to 43	G6 = 20 to 26

The item difficulty index (Pi) in this study was calculated as the percentage of interviewees who acknowledged an item correctly.

$$Pi = \frac{ni}{Ni} \times 100$$

Where; *Pi* = Difficulty index (%) for the ith item, *ni* = Number of respondents who answered the ith item correctly, *Ni* = Total number of respondents who were administered the ith item (30 in this case)

The discrimination index evaluates how effectively an item separates informed from uninformed respondents. In this study, the E1/3 formula was used to calculate the discrimination index.

$$E\ 1/2 = \frac{\{(S1 + S2) - (S5 + S6)\}}{N / 3}$$

Where; *E* 1/3 = Discrimination index of an item, *S*1, *S*2, *S*5, *S*6 = Frequencies of correct answers in groups G1, G2, G5, and G6, respectively, *N* = Overall number of respondents in the sample for item analysis (30 in this case)

RESULTS AND DISCUSSION

Final selection of items for the test

The items selected for the knowledge assessment were determined based on a difficulty index ranging from 46.6 to 93.3 and a discrimination index ranging from 0.1 to 0.9. Hence, out of the 56 items initially selected only 34 were retained as mentioned in Table 1.

Reliability of the test

In order to appraise the reliability of the knowledge test, the split-half method was employed. The test consisted of 34 items, which were divided into two equal halves based on odd and even item numbers. This split-half test was then administered to a group of 24 farmers. As a result, two arrays of scores were obtained, and these scores were correlated using the product-moment correlation. The resulting product-moment correlation coefficient between the two sets of scores was determined to be 0.82. This product-moment correlation coefficient serves as the reliability coefficient for half of the test. However, this coefficient underestimates the reliability of the full-length measure, which encompasses a broader sample of the content domain and tends to generate a wider range of scores. The correction factor used to obtain the full-length reliability coefficient, according to the Spearman-Brown prophecy formula, is calculated using:

$$rtt = \frac{2 \times r\ ½}{1 + r\ ½}$$

Where, *rtt* = Reliability coefficient of the complete test; *r* 1/2 = Reliability coefficient of the half test

The value of rtt was determined to be 0.90, indicating a good internal consistency of the knowledge test.

Test of validity

The point-biserial correlation coefficient (rp-bis) was estimated to establish the internal validity of the test. The formula for calculating rp-bis for each item is as follows:

$$rp - bis = \frac{(Mp - Mq)}{\sqrt{pq}} \times \sigma$$

Table 1. Organic poultry production knowledge test for tribal farmers

S.No.	Item	Point-Biserial Correlation (Rp-bis)
1	Are farmyard & poultry manure and slurry permitted in organic farming?	0.63
2	Is the transfer of livestock and poultry between inorganic and organic units permitted?	0.39
3	Should the birds be kept in isolation in usual circumstances?	0.35
4	Is it mandatory to have housing for poultry?	0.23
5	Is insulation, heating, and cooling facilities a prerequisite for organic poultry farming?	0.39
6	Is stocking density important for organic poultry farming?	0.2
7	Can poultry birds be tethered/confined in an area for long periods?	0.43
8	Is mixing between poultry and pigs permitted?	0.35
9	Should poultry have open access area for their entire lifetime?	0.21
10	Can synthetic protein/non-protein nitrogen compounds be provided?	0.2
11	Is mutilation of body parts generally allowed?	0.33
12	Can any type of feed materials and enzymes be fed to organic poultry?	0.24
13	Can Nitric acid be used for cleaning and disinfection in organic poultry farms?	0.42
14	Can non-biodegradable packaging be used during processing/sale of organic products?	0.21
15	Should the Internal Control System (ICS) in a grower group be a legal identity?	0.34
16	Do farmers who used prohibited items need to undergo the full conversion period again?	0.3
17	Is confinement of animals allowed in certain circumstances?	0.42
18	For storage of products, is fumigation of containers, irradiation/ionisation allowed?	0.22
19	What type of poultry housing should be used for construction material?	0.35
20	Each poultry house shall contain	0.22
21	Among poultry layers, which type of rearing system is used?	0.35
22	What is the usual interim/conversion period to convert a conventional farm to an organic farm?	0.23
23	If the land in the farm has attained organic status and the poultry eggs have not attained it, how much time should the poultry be raised according to organic standards before it is sold as an organic produce?	0.41
24	What is usually the minimum percentage of feed products on a dry matter basis that shall be classified as organic and be fed to poultry?	0.33
25	What is suggested to be used during the fattening phase in poultry?	0.26
26	What is the general withdrawal period of drugs when it is not specified?	0.22
27	When is hormonal treatment of birds advised for organic poultry stock?	0.38
28	What is the maximum limit set for the number of chickens per hectare?	0.31
29	What is the day length requirement of layers at 0-8 weeks of age?	0.28
30	In consultation with the veterinarian, which diseases should be tested in an organic poultry farm?	0.23
31	What treatments are recommended for pest control in organic food processing and handling?	0.22
32	Which labelling is allowed for organic products with a certification level of 70-95%?	0.24
33	Who is responsible for organising internal inspections, coordinating between field staffs, approval staff, and the accredited Certification Body?	0.41
34	Which of the following types of additives is NOT allowed to be fed to organic livestock and poultry according to the Bureau of Indian Standards?	0.26

Where; rp-bis = Point-biserial correlation coefficient, Mp = Mean score for respondents answering the item correctly (coded as 1s), Mq = Mean score for respondents answering the item incorrectly (coded as 0s), σ = Standard deviation for the entire test, p = Proportion of cases answering correctly (coded as 1s), q = Proportion of cases answering incorrectly (coded as 0s)

The point-biserial correlation coefficient for the odd number and even number statements from the 34 questions were given to 24 persons and were compared. Some of the items have stronger relationships with the overall test score than others.

Classification of tribal farmers into distinct knowledge levels

Farmers were grouped into various levels of knowledge by considering their total scores. The individuals were categorised into high, medium, and low knowledge levels by examining the cumulative scores obtained from both odd and even questions. Individual scores for both odd and even questions were obtained from a dataset of farmers in order to carry out this categorisation. Cumulative scores were calculated by summing the scores obtained for each person across all the questions. These cumulative scores were used as the basis for the subsequent categorisation. The list for their classification is mentioned in Table 2.

This tool uniquely focuses on assessing the knowledge of tribal farmers, setting it apart from other studies like Pottiez et al., (2012); Priyadarshni et al., (2020) & Bhanu et al., (2022)

Table 2. Classification of tribal farmers into distinct knowledge levels

Knowledge level	Classification
High	25-34
Medium	9-25
Low	0-9

which explore different aspects of organic farming knowledge without considering the indigenous perspective in organic poultry production. There are several benefits to using this knowledge test, including identifying knowledge gaps and enabling customised training programmes. These findings could strengthen organic poultry farming practices and boost economic growth and environmental sustainability in tribal communities by promoting policymaking, encouraging compliance with organic standards, and improving farming practices.

CONCLUSION

The present research study developed a specialised knowledge test for tribal farmers trained in organic poultry farming. The test assessed understanding of organic farming principles, best practices, disease management, and relevant aspects of organic poultry farming. The study described the standardised procedure of test development, including the identification of knowledge domains, construction of test items, and validation procedures. The results of this study suggest the need for tailored training programmes and policy initiatives that address knowledge gaps in organic poultry farming among tribal communities promoting sustainability and cultural preservation while enhancing economic opportunities within these communities.

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