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## RESEARCH ARTICLE

# Construction and Standardization of Knowledge Test for Broiler Farmers Regarding Scientific Broiler Farming Practices

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### ABSTRACT

*An appropriate knowledge test is required to evaluate the knowledge level of poultry farmers over the period as no scientifically tested and validated standard instrument is available to measure the knowledge of poultry farmers practicing broiler farming. Therefore, to study the knowledge level of broiler farmers on broiler farming, a test was constructed. Items for the knowledge test were collected from different sources, such as literature, scientists, professional colleagues, field extension personnel, experienced farmers, the private veterinary professional who works in the poultry industry, and the researcher's own experience in scientific broiler farming. Initially 108 items on various aspects of broiler farming "i.e." brooding, feeding, housing, health & bio-security, and market management" were selected. Questions were subjected to concerned scientists and extension personnel for screening out unrelated items. After screening and editing based on the view of the scientists and extension personnel 86 items were retained. These 86 items were administered to the 60 broiler farmers from non-sampling areas for item analysis to screen out non-relevant and weak items. Item analysis was carried out using the difficulty and discrimination index. A total of 42 items were selected for the last format of the knowledge test. Further, all the items were subjected to check out reliability and validity. The knowledge level of farmers was determined by the summation of correct responses to the items. This knowledge test is highly reliable, stable, very simple, and easy to use.*

**Key words :** Knowledge test for broiler farmers; Aiken's validity coefficient.

**B**roiler farming is one of the most attractive professions in the livestock sector attributed to the high feed conversion efficiency of broiler birds, low initial investment, less rearing space, faster & early returns, and lesser risk involved in comparison to layer production. In the initial stage, the poultry farmers acquire knowledge and skill about scientific broiler farming from fellow poultry farmers. To promote scientific poultry farming and make rural people self-dependent, many poultry development programs have been implemented. These programs help rural people in gaining scientific knowledge and skills about scientific poultry farming. It is therefore essential to study the knowledge level of broiler farmers about scientific broiler farming practices (brooding, feeding, housing, health & bio-security, and market management components of broiler farming)

which could be a resultant impact on the poultry development programs. An appropriate knowledge test is required to measure the knowledge of people over some time. Hence to study the knowledge level of broiler farmers on scientific broiler farming, a test was conducted.

A valid knowledge test helps us to analyze the accurate knowledge level of the individual. Knowledge was operationalized in this study as the extent of information known or possessed by the broiler farmers about scientific broiler farming practices.

### METHODOLOGY

Goswami (1987), Raj Kamal (1993) and Senthilkumar (2003) Knowledge test development procedure was adopted for this study.

*Item Collection :* The collection of questions for

the knowledge test is called items. Items for the knowledge test were collected from different sources, such as literature, scientists, professional colleagues, field extension personnel, experienced farmers, private veterinary professionals who work in poultry industries, and the researcher's own experience in scientific broiler farming. The procedure adopted in the selection of items was used by *Goswami (1987)*, *Raj Kamal (1993)*, and *Senthilkumar (2003)*.

*Initial Selection of Items* : Initially, 108 items on various aspects of broiler farming "i.e." brooding, feeding, housing, health & bio-security, and market management" were selected. These 108 items, in different formats like Yes or No questions, multiple-choice questions (MCQs), fill-in-the-blanks, and some open-ended questions were subjected to concerned scientists and extension personnel for relevancy. After screening and editing based on the view of the scientists and extension personnel, 86 items were retained. An interview schedule was prepared with 86 items. These 86 items were administered to the 60 broiler farmers from non-sampling areas for item analysis to screen out non-relevant and weak items if any.

The responses were recorded on a two-point continuum. A score of '1' was given for right and '0' for wrong response. The total number of correct responses obtained out of 86 items was the knowledge score of the broiler farmer. Thus, the range of obtainable scores was 0-86. After computing, the total scores were organized in descending order and divided into six equal groups with 10 broiler farmers in each one and counted as G1, G2, G3, G4, G5, and G6. For further item analysis, the middle two groups, G3 and G4, were discarded, and only four extreme groups with high and low scores were considered.

*Item analysis* : Item analysis was carried out using the difficulty and discrimination index. The index of the item difficulty reveals how difficult the item is; whereas the index of discrimination indicates the extent to which an item discriminates the well-informed farmer from the poorly informed ones.

*Item Difficulty Index (Pi)* : The difficulty index of an item was defined as the percentage of broiler farmers giving exact answers to that particular item. Item difficulty index formula is given below:

$$P_i = \frac{n_i}{N_i} \times 100$$

Where,

Pi = Difficulty index in the percentage of i<sup>th</sup> item.

n<sub>i</sub> = Number of broiler farmers given the exact answer to the i<sup>th</sup> item.

N<sub>i</sub> = Total number of broiler farmers to whom the i<sup>th</sup> item was subjected.

*Item Discrimination Index* : The item discrimination index formula is given below:

$$E1/3 = \frac{(S1 + S2) - S5 + S6}{N/3}$$

Where,

S1, S2, S5, and S6 were the frequencies of exact answers in G1, G2, G5, and G6 groups respectively, and N = Total number of broiler farmers in the sample of item analysis i.e., 60 in the present study.

The final choice of items for the knowledge test was based on the results of the difficulty and discrimination index. A total of 42 items were selected for the last format of the knowledge test. Further, all the items were subjected to check out reliability and validity. In the present study, reliability was measured by the split-half method in which all 42 items were split into two halves of 21 each and were administered to 36 broiler farmers. Scores of two sets of items were obtained and to make out the correlation between the two sets correlation coefficient was determined. Spearman-Brown Prophecy Formula (also known as Spearman-Brown Prediction Formula) was used to calculate the reliability of the full test and is given as below:

$$R = \frac{2r}{1+r}$$

Where ,

R = Reliability of full test and

r = Correlation between two halve sets

For determining the internal consistency of the knowledge test, Cronbach's alpha ( $\alpha$ ) was analyzed by the formula given below:

$$\alpha = \frac{N+c}{V} \times c$$

Where,

N = Number of items, v = Average variance.

c = Average covariance between item-pairs and

Aiken's validity coefficient (V) is used to decide the validity of the knowledge test. For computing, the Aiken's V coefficient, all 42 items of the knowledge test were rated by 36 experts in the field on a five-point continuum scale (1 to 5), 1 for the invalid and 5 for the highly valid item. The scores given by experts for every single item were enumerated as 'r'. The 'r' was

converted to ‘S’ by subtracting the obtained score with the lowest obtainable score for that item ( $S = r - \text{lowest score}$ ). By using calculated ‘S’, Aiken’s V coefficient was analyzed. The formula was given below

$$v = \frac{\sum S}{n(c - 1)} \times c$$

Where,

n = number of experts; c = maximum obtainable score.

## RESULTS AND DISCUSSION

*Selection of Items for the Test* : In the present study, items with a difficulty index ranging from 30 to 80 and a discrimination index ranging from 0.30 to 0.55 were included in the last format of the test. The item difficulty index and discrimination index of all the 86 items were calculated and 42 items that fulfilled both the criteria were selected for the last format of the knowledge test (Table 1)

*Scoring method* : The knowledge level of farmers was determined by the summation of correct responses to the items. As the final format of the knowledge test was inculcated with 42 items hence, the range of scores was from 0 to 42.

*Reliability* : The coefficient of correlation between two sets of scores was computed and the coefficient value (0.837) was found to be significant at a 1% level. The reliability coefficient is 0.91. The internal consistency of the test was checked out by using Cronbach’s alpha ( $\alpha$ ) and the calculated value is 0.768. All the coefficients were found to be significant at a one percent level of significance. Thus, obtained reliability coefficient indicated that the internal consistency of the knowledge test is quite high. Hence the knowledge test developed was reliable and highly stable.

*Validity of the knowledge test* : The validity of the knowledge test was determined by using Aiken’s

**Table 1. Items difficulty, discrimination indices and Aiken ‘V’ coefficient for knowledge test**

Knowledge item	Diff. Ind.	Dis. Ind.	Aiken V coeff.
How many days before the arrival of chicks litter should be spread on the floor? a) 2 days; b) 3 days; c) 4 days; d) 1 day	61.67	0.40	0.868
Fumigation with potassium permanganate and formaldehyde (1:1) should be done for disinfecting the brooder house	38.33	0.50	0.861
Paper should be removed on the 6 <sup>th</sup> day from litter material in the brooder house	31.67	0.35	0.833
Evenly distributed chicks under the hover indicates- a) High temperature in the brooder house; b) Low temperature in the brooder house; c) Optimum temperature in the brooder house; d) Other	80	0.35	0.931
What should be the ideal weight of day-old chicks? a) 45gm; b) 30gm; c) 50gm; d) Any	58.33	0.45	0.889
How many hours before the arrival of the chick proper temperature should be maintained in the brooder house? a) 12hr; b) 24hr; c) 36hr; d) Any	60	0.4	0.847
What optimum temp. (°F) should be maintained in the brooder house? a) 95 °F; b) 92 °F; c) 98 °F; d) Any	50	0.5	0.923
Corrugated paper is used in the brooder house to a) Feeding; b) Prevent from lameness; c) Both; d) Any	58.33	0.45	0.826
Longitudinal direction of poultry shed in a hot climate should be east-west	66.67	0.30	0.91
Average floor space requirement for broiler bird is a) 1 sq. feet; b) 2 sq. feet; c) 3sq. feet; d) Any	51.66	0.45	0.93
What is the average floor space required for heavy birds? a) 1.5sq ft; b) 1 sq feet; c) 2sq feet; d) Any	45	0.35	0.826
What should be the thickness of litter material ? a) 2-4 inches; b) 1-2 inches; c) 4-6 inches; d) Any	61.67	0.45	0.91
What should be the width of the poultry house to avoid ventilation problems in poultry house? a) 25-30 feet; b) < 25 feet; c) > 30 feet d) Any	33.33	0.55	0.881
The litter should be given turning a) Daily; b) At alternate day; c) Monthly; d) Any other	31.67	0.30	0.881
Waterer and feeder should be cleaned a) Daily; b) At alternate day; c) Monthly; d) Any other	35	0.45	0.847
Excess moisture in the litter is corrected by mixing of a) Lime dust; b) Lime; c) Sand; d) Other	33.33	0.50	0.833
Up to which age broiler starter feed is provided? a) Up to 21 days of age; b) Up to 30 days of age; c) Other	46.67	0.35	0.944
For which age group of broiler birds should be provided finisher feed a) Up to 21 days of age; b) 22 days of age till marketing; c) Other	55	0.30	0.881
Vitamins and minerals help in reducing stress conditions in poultry	50	0.35	0.847
Pelleting method should be used to reduce food wastage in poultry	75	0.45	0.819
Broiler performance is calculated by using ‘feed conversion ratio’	46.67	0.35	0.944
Adlib water and restricted feeding in the summer helps in the flock management	73.33	0.40	0.937
Foot bath should be necessary at the entry gate of poultry farm	71.67	0.30	0.91
Safe disposal method for birds should be- a) Burying; b) Throwing away; c) Incineration; d) Burning; e) All	76.67	0.35	0.91

How cold chain of vaccine is maintained? a) Keeping the vaccine at 4-5°C; b) Keeping the at 0°C; c) Other	78.33	0.30	0.854
Vaccination is done in day old chicks	70	0.35	0.881
Ranikhet vaccine is provided at 6-7 days-old chick	35	0.45	0.895
What is the route/method of Ranikhet vaccine? a) Eye drop or intranasal route; b) With drinking water	50	0.55	0.833
Gumboro intermediate vaccine is provided at 10-12 days old chick	33.33	0.40	0.881
Lasota vaccine is provided at 18-21 days old chick	31.33	0.50	0.937
Lasota vaccine is provided in mixing in drinking water	35	0.45	0.826
What are the methods of broiler bird's vaccination-a) Eye drop; b) Intra-nasal; c) Drinking water; d) All	76.6	0.35	0.84
Best time to vaccinate the birds is- a) Morning; b) Evening; c) Noon; d) Any time	46.67	0.45	0.868
Panting of birds indicates-a) Increase temp; within poultry house b) Noise within poultry house c) Other	80	0.30	0.91
Increased ammonia in air causes a) Respiratory problem; b) Nervous problem; c) Other	71.67	0.40	0.861
Multivitamins are given after vaccination in the birds	61.67	0.55	0.875
Maximum mortality rate in ideal condition at broiler farm should be-a) 5%; b) 10%; c) 15%; d) Undecided	75	0.40	0.902
What should be the marketable age of broiler birds? a) 36-42days old; b) >45days old; c) Any; d) None	76.67	0.45	0.889
What is ideal body weight of broiler at 36-42 days? a) 2kg-2.5kg; b) 1.5 kg; c) 3 kg; d) Any	73.33	0.50	0.889
What are different channels of marketing of the broiler birds? a) Consumer b) Retailer c) Whole seller d) Local market e) All above	61.66	0.35	0.91
Do you keep in mind the demand fluctuation of broiler birds for getting high price?	55	0.45	0.826
Do you aware of seasons where the price of broiler birds becomes high?	78.33	0.30	0.937

**Table 2. Knowledge test for broiler farmers regarding scientific broiler farming practices**

Knowledge items	Response	Scores
<i>Brooding management</i>		
How many days before the arrival of chicks litter should be spread on the floor? a) 2 days; b) 3 days; c) 4 days; d) 1 day		
Fumigation with potassium permanganate and formaldehyde (1:1) should be done for disinfecting the brooder house (Yes/No)		
Paper should be removed on the 6 <sup>th</sup> day from litter material in the brooder house (Yes/No)		
Evenly distributed chicks under the hover indicates-a) High temperature in the brooder house; b) Low temperature in the brooder house; c) Optimum temperature in the brooder house; d) Other		
What should be the ideal weight of the day-old chicks? 45gm; b) 30gm; c) 50gm; d) Any		
How many hours before the arrival of the chick proper temperature should be maintained in the brooder house? 12hr; b) 24hr; c) 36hr; d) Any		
What optimum temperature (F <sup>o</sup> ) should be maintained in the brooder house? a) 95 °F; b) 92 °F; c) 98 °F; d) Any		
Corrugated paper is used in the brooder house to-a) Feeding; b) Prevent from lameness; c) Both; d) None		
Longitudinal direction of poultry shed in a hot climate should be east-west		
Average floor space requirement for broiler bird is a) 1 sq. feet b) 2sq. feet c) 3sq. feet d) Any		
What is the average floor space required for heavy birds? 1.5sq. ft b) 1sq. feet c) 2sq. ft d) Any		
What should be the thickness of litter material in the poultry house? a) 2-4 inches; b) 1-2 inches; c) 4-6 inches d) Any		
What should be the width of poultry house to avoid ventilation problems in poultry house? 25-30 feet; b); < 25 feet c) > 30 feet; d) Any		
The litter should be given turning-a) Daily; b) At alternate day; c) Monthly; d) Any other		
Waterer and feeder should be cleaned Daily; b) At alternate day; c) Monthly; d)Any other		
Excess moisture in the litter is corrected by mixing of a) Lime dust; b) Lime; c) Sand; d) Other		
<i>Feeding management</i>		
Up to which age broiler starter feed is provided? a) Up to 21 days of age b) Up to 30 days of age; c) Other		
For which age group of broiler birds should be provided finisher feed. a) Up to 21 days of age b) 22 days of age till marketing c) Other		
Vitamins and minerals help in reducing stress conditions in poultry. (Yes/No)		
Pelleting method should be used to reduce food wastage in poultry. (Yes/No)		
Broiler performance is calculated by using 'feed conversion ratio'. (Yes/No)		
Adlib water and restricted feeding in the summer helps in the flock management. (Yes/No)		
Foot bath should be necessary at the entry gate of poultry farm. (Yes/ No)		
Safe disposal method for birds should be-a) Burying, b) Throwing away, c) Incineration; d) Burning e) All		
How cold chain of vaccine is maintained? - a) Keeping the vaccine in the refrigerator at 4-5°C; b) Keeping the vaccine in the refrigerator at 0°C; c) Other		
Vaccination is done in day-old chicks. (Yes/No)		

Ranikhet vaccine is provided at 6-7 days old chick. (Yes/No)

What is the route/method of Ranikhet vaccine? Eye drop or intranasal route b) With drinking water

Gumboro intermediate vaccine is provided at 10-12 days old chick. (Yes/No)

Lasota vaccine is provided at 18-21 days old chick. (Yes/No)

Lasota vaccine is provided in mixing in drinking water. (Yes/No)

What are the various methods of broiler bird's vaccination- a) Eye drop; b) Intra-nasal; c) Drinking water; d) All above

Best time to vaccinate the birds is- a) Morning; b) Evening; c) Noon; d) Any time

Panting of birds indicates-a) Increase temp. within poultry house; b) Noise within poultry house; c) Other

Increased ammonia in air causes-a) Respiratory problem; b) Nervous problem; c) Other

Multivitamins are given after vaccination in the birds. (Yes/No)

Maximum mortality rate in ideal condition at broiler farm should be-a) 5%; b) 10%; c) 15%; d) Undecided

#### Marketing management

What should be the marketable age of broiler birds? a) 36-42days old b) >45days old c) Any

What is ideal body weight of broiler at 36-42 days? a) 2kg-2.5kg b) 1.5 kg c) 3 kg d) Any

What are different channels of marketing of the broiler birds? a) Consumer b) Retailer c) Whole seller d)

Local market e) All above

Do you keep in mind the demand fluctuation of broiler birds for getting high price? (Yes/No)

Do you aware of seasons where the price of broiler birds becomes high? (Yes/No)

Validity (or V) coefficient given by *Aiken (19850)* and the results are revealed in table 1.

All the coefficients were found to be significant at one percent and five percent levels of significance. Hence the knowledge test developed was highly stable, reliable, and valid.

*Content Validity of Knowledge Test* : Content validity means representativeness of the content of a measuring instrument. In the final selection of items, care was taken to include items covering entire part of the scientific broiler farming and Items were collected from various sources literature, scientists, extension personnel, doctor work in poultry industries, including experts from the poultry field. Hence it was assumed that the scores obtained by administering the test measures knowledge of the broiler farmers as it intended. The final knowledge test is given in Table 2.

## CONCLUSION

Respondent's reactions toward training and knowledge gain tests are highly essential. Knowledge tests help to assess which group of broiler farmers has higher knowledge and correlate with the training and set forth an example to approve training needed to the broiler farmers. Extension personnel may use this test to determine whether the objectives of the training have been achieved and the knowledge of the farmers has been enhanced. It may help trainers and policymakers to formulate strong strategies for better performance of farmers. In this study knowledge test for broiler farmers regarding scientific broiler

farming was developed and standardized. It was highly reliable and stable. Bodies can use this test to determine the knowledge level of broiler farmers. It is very simple and easy to use.

## CONFLICTS OF INTEREST

The authors have no conflicts of interest.

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