The Pharma Innovation Journal 2023; SP-12(10): 1888-1893

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; SP-12(10): 1888-1893

www.thepharmajournal.com
Received: 13-08-2023
Accepted: 18-09-2023

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A scale to measure goat farmer's attitude towards implementing artificial insemination (AI) in goat breeding system

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Abstract
The objective of the study was to develop and standardize a reliable and valid scale to assess the attitudes of goat farmers towards implementing artificial insemination (AI) in goat breeding system. A summated rating scale based on Likert (1932) method was developed through collection of items, relevancy test, item analysis, reliability and validity. Based on "t" value (>1.75), fourteen (14) statements were finally selected to constitute the attitude scale. Reliability of the scale was calculated by using split half method and the entire scale reliability coefficient was found to be 0.85. Furthermore, a high Content Validity Index (CVI) of 0.95 demonstrated that, the statements on the scale accurately measured what it was intended to measure. Therefore, researchers can use the scale in future for measuring the attitude of other livestock farmers in similar kind of studies.

Keywords: Artificial insemination, attitude scale, goat farmers, summated rating method

Introduction
Good productions as well as good reproduction are two essential elements for making the goat farming a viable one. In many parts of India, where goat farming accounts for a significant portion of the economy, breeding is still done through uncontrolled spontaneous mating. There ought to be enough higher-caliber stud bucks for better breeding control. But sadly, there aren't enough breeding bucks to support more than 30% of estrus does. Cryopreservation of superior native buck semen and artificial insemination are the only methods available to prevent negative selection and to manage breeding policy effectively (Dhara *et al*., 2023) [2]. But in actuality, lack of use of these technologies and insufficient involvement in breeding programmes are the main causes of breeding projects' poor results. One of the key players in the adoption or rejection of technology is the farmer. However, adoption level of the scientific breeding practices can be attributed to a variety of factors, including the attitude of the farmers (Gautam *et al*., 2015 and Witjaksono *et al*., 2021) [7, 21]. Rao *et al*. (1990) [16] reported that, farmer's attitude towards the livestock production and breeding technologies and their level of adoption are significantly correlated. However, a major impediment to the execution of attitudinal research about livestock breeding methods is the lack of a reference scale for evaluating such attitude (Martin-Collado *et al*., 2021) [13]. Additionally, there was insufficient empirical data about the significant determinants influencing adoption decisions, intensity of AI, farmers attitude etc. (Gebre *et al*., 2022) [8]. In this light, this study was designed with the intention of developing a scale to measure the goat farmers' attitude towards implementing artificial insemination (AI) technology in goat breeding system.

Methodology
The method suggested by Likert (1932) [12] in developing summated rating scale was followed through five stages *viz*. statement collection, relevancy test, statement analysis, and reliability and validity assessment.

1. Collection of statements
From a survey of the literature, discussions with extension professionals, veterinary officials, Progressive farmers etc., a large number of statements on farmers' commitment on 'implementing AI technology in goat breeding system' were collected respectively. The total number of statements collected from different sources were 58. In the scale, an effort was

made to include an equal amount of comments that were positively and negatively expressed. Some statements were overlapping, double negative, unclear, etc. So, to prevent ambiguity and duplication, those statements were discreetly revised and restructured according to the criteria laid down by Likert (1932) [12], Edward (1957) [3], Edwards and Kilpatrick (1948) [5] and Edwards (1969) [4]. From those 58 statements, 42 statements were finally selected for judgment.

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Screening of Statements

The selected statements were mailed with appropriate instruction to 76 judges who were professional experts in the field of veterinary and allied sectors. They were asked to check each of the statement carefully for being relevant or not relevant, using three point continuum, via. Most Relevant (MR), Relevant and Not Relevant (NR). The judges were also requested to make necessary modifications and addition or deletion of statements, if they desired so. The responses were received from 50 judges (66 %) by 30th September 2023 (Fig 1).

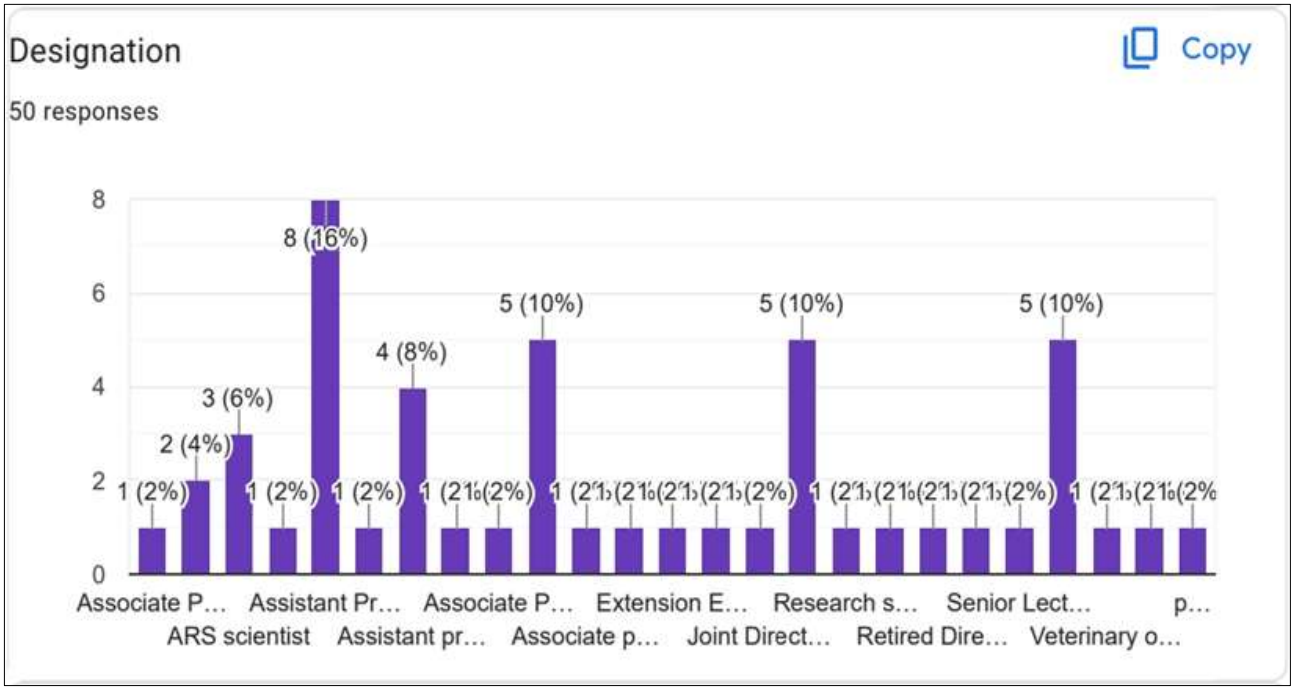

Fig 1: Published analytics through Google form questionnaire

2. Relevancy analysis

The relevancy score for each statement was worked out by using following formula:

i) Relevancy percentage (RP)

$$RP = \frac{\text{More Relevant responses x 3 + Relevant responses x 2+ Not relevant x1}}{\text{Maximum possible score obtained by each respondents (42x3)}} X\ 100$$

ii) Relevancy weightage (RW)

$$RW = \frac{\text{More Relevant responses x 3 + Relevant responses x 2+ Not relevant x1}}{\text{Maximum possible score obtained by each respondents (42x3)}}$$

iii) Mean Relevancy score (MRS)

$$MRS = \frac{\text{More Relevant responses x 3 + Relevant responses x 2+ Not relevant x1}}{\text{No of Judges Responded (50)}}$$

The statements having relevancy percentage of more than 75 per cent, relevancy weightage of more than 0.75 and mean relevancy score of more than 1.5 were considered for the final selection of statements. Accordingly, 5 statements were rejected as well as deleted and 5 statement was added and revised as per the judges' suggestion (Table 1).

3. Item analysis

By the Relevancy analysis process, 22 statements were selected for the item analysis of attitude scale construction in the first stage. Item analysis is an important step in the construction of a valid and reliable scale. An item analysis's objective is to determine which statement constitute an internally consistent scale and to eliminate those that do not. (Spector, 1992) [20].

A questionnaire was prepared consisting of 22 statements and was used to collect responses from 30 numbers of goat farmers (respondents) from a non-sample area through direct interview (Fig. 2 and Fig. 3). The respondents were asked to indicate their degree of agreement or disagreement with each statement on five-point continuum containing Strongly agree, Agree, Undecided, Disagree and Strongly disagree with the scoring pattern 5, 4, 3, 2 and 1 for positive statements and 1, 2, 3, 4 and 5 for negative statements respectively. The attitude score of a respondent was obtained by summing up the scores of all items. Thus, total score obtained by each respondent was calculated ranging from 22 to 110. Furthermore, the scores of the respondents were arranged in descending order. Eventually, for the purpose of item analysis, 25 percent of the respondents with highest total scores and 25 per cent of the respondents with lowest total scores were selected. These two groups provided the criterion groups in terms of which item analysis was conducted.

Table 1: Relevancy percentage, Relevancy weightage and Mean relevancy score of the statements based on the responses given by 50 judges

Sl. No.	Statements	Relevance analysis			
		RP	RW	MRS	Remark
1	AI technology is a potential tool for dealing with breeding problem.	69.84	0.70	1.72	NS
2	AI technology creates a positive impact on earning process.	86.50	0.86	2.12	Selected
3	I like to introduce AI technology by understanding the current demand of goat husbandry.	71.42	0.71	1.80	NS
4	AI is the most important technology to upgrade livestock.	80.95	0.80	2.04	Selected
5	AI Technology is a simple, quick and affordable method.	63.49	0.63	1.6	Selected
6	Proper information & knowledge on AI technology is important before its implementation.	70.63	0.70	1.78	NS
7	AI reduces the purchasing and maintaining cost of bucks.	78.57	0.80	1.98	Selected
8	AI for goats does not offer the same level of return as that for large ruminants.	75.40	0.75	1.9	Selected
9	Farmers will implement AI technology in their farm if provided govt. subsidy.	76.19	0.76	1.92	Selected
10	It is unfortunate that we don' have substitute for traditional goat breeding practices.	78.57	0.79	1.98	Selected
11	I won't bother about consequences after implementing AI technology in goat breeding system.	72.22	0.72	1.82	NS
12	There is no risk in implementing AI technology in goat breeding system.	73.81	0.73	1.86	NS
13	There is more orthodox misinformation about AI technology than truth.	82.54	0.82	2.08	Selected
14	Believed in scientific way of upgrading goat breeding management system.	74.60	0.74	1.8	NS
15	I do not like to advice my peer to implement AI technology in their goat farms.	73.80	0.73	1.86	NS
16	Govt. is giving more importance of AI service to large farmers than small holders.	50.79	0.50	1.28	NS
17	AI technology are not useful ways of improving goat performance.	58.73	0.58	1.48	NS
18	Implementing AI technology is a wastage of money.	75.40	0.75	1.9	Selected
19	AI will help in preventing transmission of many diseases.	80.95	0.80	2.04	Selected
20	Comprehensive knowledge about AI technology is beyond the capacity of small-marginal goat farmers.	75.40	0.75	1.9	Selected
21	I have tried all mating system than AI.	74.60	0.74	1.88	NS
22	I will try AI technology until vast majority accept them.	76.98	0.77	1.94	Selected
23	Technical assistant and veterinary facilities for AI service are must needed factors for its implementation.	57.93	0.57	1.46	NS
24	On-time accessibility to AI and AI service facilities are must needed factors.	60.31	0.60	1.52	NS
25	I believe AI technology as a time consuming process.	61.90	0.61	1.56	NS
26	Training program will encourage rural youth to implement AI in goat breeding system.	75.40	0.75	1.9	Selected
27	Goats reared were not much productive and prolific by the prior natural breeding practice.	76.19	0.76	1.92	Selected
28	My Peers or neighbors or relatives etc. gave me advice to try AI in goat farm.	71.42	0.71	1.8	NS
29	Societal pressure for implementing AI technology in livestock is an issue.	75.40	0.75	1.9	Selected
30	AI service cannot meet location specific needs of the goat farmers.	65.10	0.65	1.64	NS
31	Implementing AI in goat husbandry can bring remarkable change in women goat farmers' livelihood.	83.33	0.83	2.10	Selected
32	Conventional breeding practices cannot be substituted by AI	61.11	0.61	1.54	NS
33	Introducing AI technology is only a resourceful and educated farmers' custom.	75.39	0.75	1.9	Selected
34	Its execution will benefit, from the availability of skilled inseminators, door step and on-time service facilities.	76.19	0.76	1.92	Selected
35	I am challenged by uncertainties.	71.42	0.71	1.8	NS
36	I am reluctant to implement AI or any new thing due to service unattainability.	84.13	0.84	2.12	Selected
37	It lead to post AI complicacies.	52.38	0.52	1.32	NS
38	Cross bred animal is not a symbol of progressiveness in the society.	76.98	0.76	1.94	Selected
39	Market value of AI offspring is same as other mated offspring.	76.19	0.76	1.92	Selected
40	AI can overcome the problem related to poor availability of good-quality bucks in the villages.	80.15	0.80	2.02	Selected
41	AI leads to more chance of getting male.	54.76	0.55	1.38	NS
42	Poor post AI goat management is a constraint	69.84	0.70	1.76	NS

Fig 2: Data collection for item analysis

Fig 3: Goat rearers from non sample area

Fig 4: Data collection for reliability test

Quantifying t-value

The t-value (critical ratio), a measure of the extent to which a given statement differentiates between high and low groups of subjects for each statement, was calculated using the formula given by Edwards (1957) [3].

$$t = \frac{\bar{x}_H - \bar{x}_L}{\sqrt{\frac{(X_H - \bar{X}_H)^2 \pm (X_L - \bar{X}_L)^2}{n(n-1)}}}$$

Where,

$$\sum (X_H - \bar{X}_H)^2 = \sum (X_H)^2 - \frac{(\sum X_H)^2}{n}$$

$$\sum (X_L - \bar{X}_L)^2 = \sum (X_L)^2 - \frac{(\sum X_L)^2}{n}$$

$\bar{X}_H$= Mean score of given statement of high group

$\bar{X}_L$= Mean score of given statement in low group

$\sum X_H$= Summation of scores on given statement for high group

$\sum X_L$= Summation of scores on given statement for low group

$\sum (X_H)^2$= Sum of squares of individual score on a given statement for high group

$\sum (X_L)^2$= Sum of squares of individual score on a given statement for low group

n = Number of respondents in each group

4. Reliability assessment of the Scale

Validity and reliability increase transparency and decrease opportunities to insert research bias in qualitative research (Singh, 2014) [18]. To know the reliability of the attitude scale Split-Half method was followed. Reliability was calculated using the split- half technique where the scale was divided into two halves based on odd and even number of statements. The co-efficient of reliability between the two sets of score was calculated by using Spearman-Brown (1910) [19] prophecy formula cited by Zeller and Carmines (1980) [22] which is given below:

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

Where,

R= Reliability coefficient of the whole scale

r = Estimated correlation between two halves (Pearson r)

5. Validity assessment of the scale

Measuring content validity requires input from a judging panel of subject matter experts. For this, specialists of extension, veterinarian and statisticians were the judges. They were asked to check each of the statement carefully for being 'Essential (E)', 'Relevant but not essential (RNE)' and 'Not essential (NE)'. The higher the agreement among judges that a particular statement is essential, the higher that statement's level of content validity is. The following formula was used to calculate the content validity ratio (CVR) for each statement as per Nikolopoulou (2023) [14] as shown in Table 3:

Content Validity Ratio = (ne − N/2) / (N/2)

Where,

ne = number of judges indicating "essential"

N = total number of judges

This formula yields values which range from +1 to −1. Values above 0 indicated that at least half the judges agree that the statement is essential. The closer to +1, the higher the content validity.

No of Judges	5	6	7	8	9	10	20	30	40
Critical value (CV)	0.99	0.99	0.99	0.75	0.78	0.62	0.42	0.33	0.29

Further, the Content validity index (CVI) was used to measure the content validity of the entire test. The CVI is the average CVR score of all statements in the test. The CVI value higher than Critical value (CV) denoted higher content validity of the statements.

CVI=Sum of CVRs of the total statements/ No of judges

Result and Discussion

t-value

After computing the t-value for the statements, the thumb rule of rejecting items with t-value less than 1.75 was followed for both the positive and negative statements (Edwards, 1957) [3]. Eventually, the statements having the higher t-values were selected. Thus, the final scale consists of 14 (9 positive and 5 negative) statements which are presented in Table 2. Pongener and Jha (2019) [15] and Harisha *et al*. (2020) [10] also cited a similar type of procedure.

Table 2: List of selected scale statements

Sl. No.	Initial Statement no	Final Statement	t-value	Nature of statement
1	2	AI technology creates a positive impact on earning process.	6.04*	+
2	4	AI is the most important technology to upgrade livestock.	5.22*	+
3	8	AI for goats does not offer the same level of return as that for large ruminants.	4.05*	-
4	13	There is more orthodox misinformation about AI technology than truth.	1.82*	+
5	18	Implementing AI technology is a wastage of money.	2.17*	-
6	19	AI will help in preventing transmission of many diseases.	3.77*	+
7	20	Comprehensive knowledge about AI technology is beyond the capacity of small-marginal goat farmers.	1.91*	-
8	26	Training program will encourage rural youth to implement AI in goat breeding system.	4.22*	+
9	27	Goats reared were not much productive and prolific by the prior natural breeding practice.	2.91*	+
10	29	Societal pressure for implementing AI technology in livestock is an issue.	1.99*	-
11	31	Implementing AI in goat husbandry can bring remarkable change in women goat farmers' livelihood.	4.02*	+
12	33	Introducing AI technology is only a resourceful and educated farmers' custom.	2.27*	-
13	34	Its execution will benefit, from the availability of skilled inseminators, door step and on-time service facilities.	1.77*	+
14	40	AI can overcome the problem related to poor availability of good-quality bucks in the villages.	3.79*	+

*'t' value equal to or greater than 1.75

Reliability of the scale

Reliability is the accuracy or precision of measuring instrument (Ganeshkumar and Ratnakar, 2011) [6]. According to Ray and Mondal (1999) [17], reliability refers to the precision or accuracy of measurement or score. A scale is reliable when it produces the same results when applied to the same sample (Gautam *et al*., 2015) [7].

In the present scale development process, 14 statements were split into two equal halves on the basis of odd and even number of statements and administered to 30 selected goat farmers (respondents) in a non-sample area (Fig.4). Score of all the 30 respondents for each statements of two halves were calculated. The two sets of scores were found to have a 0.74 correlation coefficient. The reliability coefficient of the entire scale was found to be 0.81, which is in range of 0.8 to 0.9, indicated a higher reliability of the scale. Pongener and Jha (2019) [15] also cited a similar kind of procedure.

Validity of the scale

Since "the degree to which a test measures, what it claims to measure," or "the truthfulness" of a claim, is what is meant by "validity" (Kerlinger, 1973) [11]. Measuring content validity correctly is important—a high content validity score shows that the construct was measured accurately (Nikolopoulou, 2023) [14].

Table 3: Content validity ratio (CVR) for each statements

Statement no	Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6	Judge 7	Judge 8	Judge 9	Judge 10	CVR
2	E	E	E	E	E	E	E	E	E	E	1
4	E	E	E	E	E	E	E	E	E	E	1
8	E	E	E	E	E	E	E	E	E	E	1
13	E	E	E	E	E	E	E	E	E	E	1
18	E	E	NE	E	RNE	E	E	E	E	E	0.6
19	E	E	E	E	E	E	E	E	E	E	1
20	E	E	E	E	E	E	E	E	E	E	1
26	E	E	E	E	E	E	E	E	E	E	1
27	E	E	E	E	E	E	E	E	E	E	1
29	E	RNE	E	E	E	E	E	E	E	E	0.8
31	E	E	E	E	E	E	E	E	E	E	1
33	E	E	E	E	E	E	E	E	E	E	1
34	E	E	E	E	E	E	E	E	E	E	1
40	E	E	E	E	E	E	E	E	E	E	1

E-Essential, RNE-Relevant but not essential, NE-Not essential

The content validity ratio (CVR) for each statements are shown in Table 3. Values higher than 1 demonstrated that 85.71% of the judges thought the statements were 'Essential'. For a panel of 10 judges, the Content Validity Index (CVI) was compared with the Critical Value (CV), and it was found that the CVI (0.95) was greater than the CV (0.62). This demonstrated that the statements on the scale correctly reflect what it was intended to measure.

Conclusion

The present scale, with fourteen statements, is a reliable and valid scale to assess the attitude of goat farmers towards implementing artificial insemination (AI) technology in goat breeding system. Researchers can use the scale in future for measuring the attitude of livestock farmers in similar kind of studies. This in turn, will greatly aid in designing extension strategies and activities that are practical and effective.

Reference

1. Brown W. Some experimental results in the correlation of mental abilities. Br J Psychol. 1910;3:296-322
2. Dhara S, Thakur S, Anwar S, Gupta M, Sinha S. Artificial insemination in goat: A new prospect for scientific goat breeding. Animal Reproduction Update. 2023;3(2):1-5. https://doi.org/10.48165/aru.2023.3.2.1.
3. Edward AL. Techniques of attitude scale construction, Appleton Century Crofts, Inc., New York; c1957.
4. Edwards AL. Te chn iqu es of attitude scale construction. Vakils and Simen Pvt. Ltd., Bombay; c1969.
5. Edwards AL, Kilpatrick FPA. A technique for the construction of attitude scales. J Appl. Psychol. 1948;32:374-384.
6. Ganesh Kumar P, Ratnakar P.A scale to measure farmers‟ attitude towards ICT based extension services. Indian Research Journal of Extension Education. Society of Extension Education (SEE), Agra; c2011.
7. Gautam, Malik A, Kamaldeep. Construction of attitude scale to measure attitude of farmers towards scientific dairy practices. Haryana Vet. (June, 2015). 2015;54(1):39-42.
8. Gebre YH, Gebru GW, Gebre KT. Adoption of artificial insemination technology and its intensity of use in Eastern Tigray National Regional State of Ethiopia.

Agric & Food Secur. 2022;11:44. https://doi.org/10.1186/s40066-022-00384-3.
9. Guilford JP. Psychometric Methods. Tata Mc GrawHill Publication Co. Ltd., Bombay; c1954. p. 378-382.
10. Harisha N, Rao BM, Krishna TG, Devy MU, Umar SKN. Scale Construction for Measuring the Attitude of Sericulture Beneficiary Farmers towards the Activities of Technical Service Centres (TSCs). Int. J Curr. Microbiol. App. Sci. 2020;9(08):2778-2787. DOI: https://doi.org/10.20546/ijcmas.2020.908.313.
11. Kerlinger FN. Foundations of behavioral research. Holt, Rinehart and Winston. New York; c1973.
12. Likert R. A technique for the measurement of attitude. Arch. Psychol. 1932;140:5-55.
13. Martin-Collado D, Díaz C, Benito-Ruiz G, Ondé D, Rubio A, Byrne TJ. Measuring farmers' attitude towards breeding tools: the Livestock Breeding Attitude Scale. Animal. 2021;15(2):100062. https://doi.org/10.1016/j.animal.2020.100062.
14. Nikolopoulou K. What Is Content Validity? | Definition & Examples. Scribbr. Retrieved October 4, 2023, from https://www.scribbr.com/methodology/content-validity/.
15. Pongener S, Jha KK. Scale for Measuring the Attitude of Farmers towards Sustainable Cultivation Practices of Pineapple. Int. J Curr. Microbiol. App. Sci. 2019;8(12):1163-1170.
16. Rao BS, Kherde RL, Rao SVN. A study on the attitude of dairy farmers towards dairy production technologies. Indian J Anim. Prodn. Management. 1990;6(3):145-149.
17. Ray GL, Mondal S. Research methods in social sciences and extension education. Kalyani Publishers, New Delhi; c1999.
18. Singh AS. Conducting Case Study Research in Non-Profit Organisations. Qualitative Market Research: An International Journal. 2014;17:77-84
19. Spearman Charles C. Correlation calculated from faulty data. British Journal of Psychology. 1910;3:271-295.
20. Spector PE. Summated Rating Scale Construction: An Introduction. Newbury Park, CA: Sage; c1992. http://dx.doi.org/10.4135/9781412986038.
21. Witjaksono J, Dahya, Tando E, Sutisna E, Jemmy J. Farmers' Attitude and Factors Influencing the Adoption of Artificial Insemination in Goat Farming System. E3S Web of Conferences. 2021, 232. 01020. 10.1051/e3sconf/202123201020.
22. Zeller RA, Carmines EG. Measurement in Social Sciences: The link between theory and data, Cambridge University Press, London; c1980. p. 54.