Full Length Article

EMPIRICAL ASSESSMENT ON ADOPTION OF TANUVAS SMART MINERAL MIXTURE BY THE DAIRY FARMERS OF TAMIL NADU

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ABSTRACT

The present study was undertaken to understand the present status of adoption of TANUVAS SMART mineral mixture, viz, complete adoption, partial adoption, discontinuance and rejection and its perceived attributes, namely, relative advantage, compatibility, complexity, observability and trialability using the schedule developed for the purpose and the economic impact. Partial budgeting was done to assess the economic impact of adopting TANUVAS SMART mineral mixture. Personal cosmopolite and personal localite communication channels had contributed majorly to the awareness of the dairy farmers followed by mass media. Majority of the dairy farmers (78%) discontinued the adoption of the innovation. Sixty six per cent of them had medium level of adoption behaviour followed by high (28%) and low (6%) level of adoption behavior. The reasons attributable were that the technology was perceived relatively less advantageous and not observable. However, it was perceived as highly compatible, less complex and trialable. Net income of the dairy farmers had increased by Rs. 2,216.80 per dairy animal per lactation due to the adoption of TANUVAS SMART Mineral Mixture. The status of adoption of TANUVAS SMART Mineral Mixture, its adoption behaviour and change in net income were found to be significantly associated with land holding, area under fodder cultivation, dairy animal possession, extension agency contact and mass media exposure of the dairy farmers.

Key words: Adoption, Attributes, Behaviour, Dairy, Mineral mixture

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INTRODUCTION

Increasing the productivity of livestock is critical to feed the growing global population. A livestock entrepreneur always expects productive and reproductive performance of animals at optimum level for enhancing benefit cost ratio. However, livestock technologies are generated and developed as per the mandates of the organization or personal motives of researchers but apparently not as per the needs and demands of the farmers or their field situations. Perception of researchers and farmers on the appropriateness and usability of livestock innovations vary significantly (Rathod and Chander, 2015a). This has led to the development of technologies which are not suitable or relevant to the farm families for whom they were evolved. Also, there is a virtual absence of 'adaptive research' before propagating the technologies and recommendations.

Hence, it is imperative to understand that the perception of potential adopter influences the adoption rather than solely on expert's assessment. Most of the technologies/ innovations concerning livestock sector have recorded poor adoption at field level due to various factors like attributes of technologies, socio-economic situation, socio-psychological and personal aspects of the users of technology.

Technology generators need to focus on improving technology in terms of performance, ease of use and fit for farming situations. Meta analysis on adoption of dairy innovations revealed that only limited research has been conducted to understand the relationship between adoption of innovations and its attributes. Existence of research gap in understanding the role of attributes and limited validation of innovations in farmer field may be the reasons for poor uptake of dairy innovations (Thirunavukkarasu and Narmatha, 2016).

Keeping this in mind, the research was undertaken to study the adoption behaviour of farmers on the TANUVAS SMART Mineral Mixture and to assess its economic impact in the Namakkal district of Tamil Nadu.

MATERIALS AND METHODS

Ex post facto research design was used for the study. A list of potential beneficiaries of the adoption of TANUVAS SMART Mineral Mixture was prepared in consultation with technology developers and other stakeholders in Namakkal District, which formed the sampling frame. From the sampling frame, 50 respondents were randomly selected. Cross sectional data was collected using a pre tested interview schedule; tabulated and analyzed by using SPSS software (Ver. 20.0).

The present status of the adoption of TANUVAS SMART mineral mixture was studied using a schedule developed by Rathod *et al.* (2016) with the score of 3, 2, 1 and 0 for complete adoption, partial adoption, discontinuance and rejection respectively. The different attributes of TANUVAS SMART Mineral Mixture perceived by the dairy farmers viz, relative advantage, compatibility, complexity, observability and trialability were studied using the schedule developed for this purpose.

Partial budgeting analysis was done to assess the benefits of adopting TANUVAS

SMART mineral mixture. It consists of four components, of which (i) added income and (ii) reduced costs are termed as positive financial changes; whereas (iii) added costs and (iv) reduced income are termed as negative financial changes. The difference between the sums of positive and negative financial changes would give the change in net income due to adoption of a particular innovation in the farming system. A negative change in the net income indicates that the adoption of a particular innovation has reduced whole farm income and the adoption decision should be reversed, while a positive change in the net income indicates that the adoption of the particular innovation is profitable. The relationship between the dependent and independent variables were analyzed using Spearman's rank order correlation.

RESULTS AND DISCUSSION

A. Source of awareness of TANUVAS SMART mineral mixture

All the dairy farmers (Table 1) were aware about the TANUVAS SMART mineral mixture and its potential applications through Veterinary Officers (100%) and through friends and relatives (100%). Further, they were informed about the innovation through mass media like newspaper (72%), radio/television (60%) and journals/magazine (48%). Few of them had obtained the information regarding the TANUVAS SMART mineral mixture through social media (36%) and through TANUVAS outreach centres (22%).

Thus, it can be concluded that personal cosmopolite and personal localite communication channels have contributed immensely to the awareness of the dairy farmers followed by mass media. Coverage of technologies through social media and the TANUVAS outreach centres have to be improved to cater the information needs of the dairy farmers.

B. Status of adoption of TANUVAS SMART mineral mixture

Among the dairy farmers who received the TANUVAS SMART mineral mixture (Table 2), majority of them discontinued (78%) the adoption of the innovation. Majority of the dairy farmers reported that the free supply of 12 packets of TANUVAS SMART Mineral Mixture under the Mission on Sustainable Dry land Agriculture (MSDA) scheme got exhausted in a year and was not supplied thereafter. Even if the farmers wanted to purchase, they had to travel to the nearest TANUVAS outreach centre which was about 25-30 kms distance away from their village. It also required substantial amount of time and mobility. Further, the farmers reported that TANUVAS SMART mineral mixture was not available in the nearest veterinary dispensary or pharmacy most of the time and hence the veterinarians tend to prescribe commercial preparations which the farmers readily purchased from the nearest pharmacy.

Only 20 per cent of the dairy farmers adopted the innovation partially because these farmers tend to travel via TANUVAS outreach centres often and used to purchase the TANUVAS SMART mineral mixture for their dairy animals. During the remaining period, they tend to purchase commercial preparations as per the veterinarians prescription. However, only 2 per cent of the farmers completely

adopted the innovation because of its advantages such as relatively cheaper cost, improvement in milk yield, conception rate and growth rate of calves, overall well-being of the dairy animals and decreased incidence of production diseases in the farm.

Yadav and Naagar (2021) reported that feeding of mineral mixtures/common salt was adopted by only 14.2 per cent farmers, 32.6 per cent farmers adopted partially and 53.2 per cent of the farmers had not adopted. Godara *et al.* (2018) also reported that low level of adoption was observed in case of feeding mineral mixture. Basunathe *et al.* (2010) reported that 77.14 per cent of the dairy farmers had not adopted the mineral mixture feeding practice whereas 9.52 per cent of them discontinued the practice. However, the present findings are contradictory to that of Chavan *et al.* (2016) and Triveni *et al.* (2017a) wherein they reported that majority of the dairy farmers adopted the practice of feeding mineral mixture and few farmers did not adopt the innovation.

C. Perceived attributes of TANUVAS SMART mineral mixture

i. Relative Advantage

Results from Table 3 indicates that all the dairy farmers perceived the initial cost for purchase of TANUVAS SMART mineral mixture as cheap since it was priced at Rs.45 per kg bag, while, the price of commercial mineral mixture preparations available in the market ranged between Rs.160/- to Rs. 220/-. Majority of the farmers felt that the profitability after adopting the innovation (82%) was meagre, procurement and utilization of the innovation was consuming substantial amount of time (90%). Likewise, 76 per cent of the dairy farmers perceived that there was no multiple use in adopting TANUVAS SMART mineral mixture even though the technology could help in improving the overall health, production and reproductive performance of the dairy animals. This could be because of its low observability.

Triveni *et al.* (2017c) reported that feeding of area specific mineral mixture was perceived as cheap (91%) and net profitability as exorbitant (93.60%) by majority of the respondents. Kumbar *et al.* (2017) also stated that majority (81%) of the farmers perceived mineral mixture as economically feasible and really affordable for the resource poor farmers and they were ready to adopt this supplementation technology in future, because of ideal attributes of innovation in the technology. However, Basunathe *et al.* (2010) reported that dairy farmers discontinued mineral mixture feeding practice because of low profit margin.

ii. Compatibility

All the dairy farmers opined that the TANUVAS SMART mineral mixture was culturally acceptable by the different sections of the society. Majority of them (70%) reported that the adoption of the innovation is independent and requires no further physical assistance in application of technology in the field level. Results further indicated that farmers perceived the TANUVAS SMART mineral mixture as situationally feasible (58%) and compatible with their requirements (50%) at the prevailing time. However, the remaining farmers perceived the innovation

as situationally unfeasible and incompatible with their needs because of their small farm size, wherein they had only1.4 milch animals in their farm.

Triveni *et al.* (2017b) reported that feeding of area specific mineral mixture and strategies for enhancement of milk yield and quality were perceived to be situationally feasible and physically necessary by majority of the dairy farmers. Majority (94%) of the farmers were selling the milk through vendor for an average price of Rs.20.86 per litre. Further, the dairy animals were fed adequately with commercial concentrate feed, bran and groundnut cake and hence, the farmers were less inclined to invest more money on complete adoption of TANUVAS SMART mineral mixture. Basunathe *et al.* (2010) also reported that dairy farmers had not adopted the mineral mixture feeding practice due to small dairy units.

iii. Complexity

Likewise, the farmers perceived no difficulty in understanding the cognitive and application aspect of the TANUVAS SMART mineral mixture like how the technology will benefit their animals and how it had to be fed to their dairy animals. The preparation was mostly mixed in the water along with the rice bran in water trough while feeding. However, all the farmers reported that the resource of the technology was scare and it consumed lot of labour because the TANUVAS SMART mineral mixture packets were not available in the nearest pharmacy or veterinary dispensary and hence the farmers had to travel 30 kms from their village to procure it. Further, purchasing and storing for longer periods resulted in cake formation and in turn the farmers have to break the cakes into powder again to use it. As a result the dairy farmers felt that adoption of TANUVAS SMART mineral mixture required considerable labour than normal feeding of concentrates.

Kumbar *et al.* (2017) reported that non availability of mineral mixture was major constraint as expressed by 39 per cent of the dairy farmers because of the inaccessibility to major markets and lack of transportation facility. Sharma (2015) and Murai and Singh (2011) also reported that non availability in villages was the main limitation for adoption of mineral mixture as expressed by 90 per cent of the dairy farmers. Few farmers also expressed that supplementation technology was laborious. Chavan *et al.* (2016) and Triveni *et al.* (2017a) also reported that few farmers did not adopt the innovation suggesting that farmers were aware of the benefits of feeding area specific mineral mixture but expected at free of cost.

iv. Observability

Majority of the dairy farmers (84%) perceived the results of adopting the TANUVAS SMART mineral mixture were invisible because they were maintaining high producing cross bred jersey cows which yielded an average of 10.08 litres per day, fed adequately with commercial concentrate feed (86%), bran (100%) and groundnut cake (72%) and the average insemination per conception was2.13. Hence, the farmers could not attribute the observable results to the innovation adopted by them. Basunathe *et al.* (2010) too reported that dairy farmers discontinued mineral mixture feeding practice

stating that the results were not directly visible after feeding it.

v. Trialability

Likewise, 64 per cent of the dairy farmers perceived the TANUVAS SMART mineral mixture innovation as trialable in small scale because of their unit availability as one kg packet and low unit price of Rs. 55 per kg. However, certain farmers opined that even smaller presentation below one kg can be useful for dairy farmers who are willing to trial for a brief period to time. Few of the farmers also reported that smaller presentation of TANUVAS SMART mineral mixture can also improve the shelf life and keeping quality of the product in the field conditions by avoiding cake formation.

D. Overall adoption behaviour of the dairy farmers regarding TANUVAS SMART mineral mixture

The results (Table 4) that 66 per cent of the dairy farmers had medium level of adoption behaviour followed by high (28%) and low (6%) level of adoption behaviour. Probable over emphasis of the 'less relative advantage' and 'poor observability' traits of the innovation by the farmers over the other less economically important traits such as compatibility, complexity and trialability attributes, though perceived better, would have made majority of the farmers to have medium adoption behaviour towards the TANUVAS SMART Mineral Mixture. Rezvanfar (2007) and Bhise *et al.* (2018) reported that overall adoption behaviour of dairy farmers towards recommended dairy management practices was found to be medium (71.50 %). Rathod and Chander (2015b) also reported that majority of the farmers belonged to medium favorable category of attributes for the selected dairy innovations.

E. Partial budgeting

In order to work out the details of the benefit obtained by adopting the TANUVAS SMART mineral mixture, partial budgeting analysis was undertake for a single dairy animal for a period of one year during which the TANUVAS SMART Mineral Mixture was given (Table 5). Farmers reported that an average of Rs.1,101.40 was added to their net income per dairy animal per lactation after excluding the cost of production. They also reported that dairy farmers could reduce the cost of production by Rs. 2,008.60 per dairy animal per lactation by avoiding the purchase of commercial concentrate at the rate of Rs.160/- to Rs. 220/- per month from retail store and avoid treating their animals for infertility and any other ailments. The farmers reported to incur an additional expense of Rs. 893.20 per dairy animal per lactation in the form of purchasing TANUVAS SMART Mineral Mixture and the purchase associated travel cost. It was evident that the net income of the dairy farmers had increased by Rs. 2,216.80 per dairy animal per lactation due to the adoption of TANUVAS SMART Mineral Mixture.

Further, it is evident that the status of adoption of TANUVAS SMART Mineral Mixture, adoption behaviour and change in net income due to adoption of innovation (Table 6) had significant positive correlation with land holding, area under fodder cultivation, dairy animal possession, extension agency contact

Table 1. Source of awareness of TANUVAS SMART mineral mixture

Sl. No.	Source of awareness	F	Percentage
1	Friends and relatives	**50**	**100**
2	Veterinary officers	**50**	**100**
3	Extension workers	**0**	**0**
4	TANUVAS	**11**	**22**
5	Radio/Television	**30**	**60**
6	Newspaper	**36**	**72**
7	Journals / Magazines	**24**	**48**
8	Social Media	**18**	**36**
9	Online sources	**2**	**4**

Table 2. Status of the adoption of TANUVAS SMART mineral mixture

Sl. No	Adopter Category	Frequency	Percentage
1	Complete Adoption	**1**	**2**
2	Partial Adoption	**10**	**20**
3	Discontinuance	**39**	**78**
4	Rejection	**0**	**0**

and mass media exposure of the dairy farmers. Hence, these factors are to be considered while planning extension programs for dissemination of TANUVAS SMART mineral mixture.

CONCLUSION

Personal cosmopolite and personal localite communication channels like veterinary doctors, friends and relatives had contributed majorly to the awareness of the dairy farmers on feeding TANUVAS SMART mineral mixture in contrast to traditional mass media. Hence, increasing the awareness about TANUVAS SMART mineral mixture and its potential impact on health and production to dairy animals in the social media and other mass media channels within short period of time after OFT and FLD will definitely help in the uptake of technology by the farmers. Though TANUVAS has innovated the technology, its dissemination in the field still remains a constraint. Availability of TANUVAS SMART mineral mixture in the veterinary dispensaries should be ensured. This would help the farmers to get access the technology easily and in turn will improve its adoption rate. The net income of the dairy farmers had increased by Rs. 2,216.80 per dairy animal per lactation by means of adoption of TANUVAS SMART

Table 3. Perceived attributes of TANUVAS SMART mineral mixture

Sl. No.	Attribute	Indicators	Opinion	F	Percentage	Opinion	F	Percentage
1	**Relative Advantage**	**Initial Cost**	Cheap	50	100	Expensive	0	0
		Profitability	Exorbitant	9	18	Meagre	41	82
		Time consumption	Time saving	5	10	Time consuming	45	90
		Multiplicity of use	Yes	12	24	No	38	76
2	**Compatibility**	**Situational**	Feasible	29	58	Unfeasible	21	42
		Cultural	Acceptable	50	100	Not Acceptable	0	0
		Physical	Compatible with needs	25	50	Incompatible with needs	25	50
		Relational	Independent	35	70	Dependent	15	30
3	**Complexity**	**Cognitive**	Easy	50	100	Complex	0	0
		Application	Adoptable	50	100	Unadoptable	0	0
		Resource	Abundant	0	0	Scare	50	100
		Labour	Saving	0	0	Consuming	50	100
4	**Observability**	**--**	Visible	8	16	Invisible	42	84
5	**Trialability**	**--**	Trialable	32	64	Not trialable	18	36

Table 4. Overall adoption behaviour regarding TANUVAS SMART mineral mixture

Sl. No	Categories	Frequency	Percentage	Mean & SD
1	Low	3	6.00	5.92
2	Medium	33	66.00	±
3	High	14	28.00	1.98

Table 5. Partial Budgeting on adoption of TANUVAS SMART mineral mixture

Positive Financial Changes		Negative Financial Changes	
Added income Rs	1,101.40	Added Costs Rs	893.20
Reduced Costs Rs	2,008.60	Reduced income Rs	0.00
Sub Total (A)	3,110.00	Sub Total (B)	893.20
		Change in Net Income (A – B)	**2,216.80**

Table 6. Relationship between independent and dependent variable regarding TANUVAS SMART Mineral Mixture

Independent Variables	Present Status of Adoption	Adoption Behaviour	Change in Net Income
1. Age	0.003	0.115	-0.017
2. Education	0.126	-0.080	0.019
3. Land holding	0.416**	0.370**	0.550**
4. Area under fodder cultivation	0.313*	0.397**	0.494**
5. Primary occupation	0.117	0.242	0.221
6. Experience in dairy farming	0.144	0.172	0.197
7. System of rearing dairy animals	0.065	0.151	-0.076
8. Dairy animal possession	0.614**	0.603**	0.587**
9. Extension agency contact	0.552**	0.458**	0.596**
10. Mass media exposure	0.302*	0.100	0.399**

** *Correlation is significant at the 0.01 level (2-tailed)*

* *Correlation is significant at the 0.05 level (2-tailed)*

Mineral Mixture and major portion of this was due to increase in the milk yield. Nevertheless, the farmers perceived that the technology was relatively less advantageous due to less profit, increased time consumption and apparent lack of multiple use of TANUVAS SMART Mineral Mixture. Majority of the farmers had perceived the technology as compatible and trialable but not observable due to the non-obvious nature of the impact of technology.

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