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Assessment of Knowledge Level of Dairy Production Technologies among Milk Producers in Oyo State, Nigeria

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Abstract

This study investigated the knowledge level of introduced Dairy Production Technologies (DPTs) among milk producers in the Dairy Development Programme (DDP), Oyo State, Nigeria. Multi-stage sampling technique was used to select 216 respondents from 27 milk producing communities across two DDP operating areas, namely Fashola and Alaga, in Oyo State, Southwest Nigeria. Data were collected, analyzed and interpreted using descriptive and inferential statistics. The results show that the mean age of milk producers was 38.88±9.82 years, with an average herd size of 13.15±7.64 lactating cows. The mean dairy experience was 22.81±12.07 years. Pastoralists' knowledge varied with respect to each technological component. Majority (91.7%) of the respondents had knowledge of milking hygiene practices (cleaning of udder and milk measurement). Few (18.5%) had knowledge of expenditure records. Chi-square analysis established association between the knowledge of DPTs and sex (χ 2= 26.959); family type (χ 2= 96.556), outside contact (χ 2= 58.504) and level of education (χ 2= 164.698) at $p \leq 0.01$. Correlation analysis revealed that at $p \leq 0.01$, there was a significant relationship between age (r = -0.348), dairy experience (r = 0.288), years of education (r = 0.669) and pastoralists' knowledge of dairy production technologies. Milk producers in the study area have knowledge deficiencies in the following DPTs: hay making (crushing and chemical treatment with urea); acquiring a crossbred animal; husbandry practices (cleaning calf nostrils, navel cutting and treatment with iodine); milking hygiene (cleaning of teats of cow after milking); record keeping (animal health, input record, expenditure). .

Keywords: Assessment; Knowledge level; Milk producers; Dairy production technologies

Abbrevations: DDP: Dairy Development Programme; DPTs: Dairy Production Technologies; ROI: Return on Investment; KAPs: knowledge, Attitudes and Practices; MCCs: Milk Collection Centers; AI: Artificial Insemination; LEAs: Livestock Extension Agents; ADP: Agricultural Development Programme

Introduction

Agricultural technologies are seen as an important route to alleviating poverty in most of the developing countries. However, the rate of adoption of these technologies has remained low in most of these countries [1]. Increasing agricultural productivity is critical to meeting expected rising food demand and, as such, it is instructive to examine recent performance in cases of modern agricultural technologies. Knowledge is simply the general awareness or possession of information, facts, ideas, thoughts or principles [2]. It is information within the mind. Agricultural Technology provides no benefits of its own; it is the application of technology to situation of needs that produces Return on Investment (ROI) in most cases. However, individual's ability to perform an act is very paramount to the actual performance of that act. Access to information and the technical know-how on what is to be done is essential. Therefore, a possible relationship between knowledge of dairy technologies and their adoption is suggested in this study. This underscores the relevance of extension services in dissemination information based on available knowledge of these technologies to dairy farmers.

Extension work involves the transfer of improved technology from technologically advanced institutions and research organizations to farmers or end users in order to increase their output of agricultural products and enhance their incomes and improve their living standards. With the recognition that dairy presents a great potential for the increasing per capita animal protein and milk consumption of Nigerian population, the need for farmers to adopt improved technologies in order to increase

their output cannot be over-emphasized. Fortunately, there is an abundance of improved production technologies that can be adopted to rapidly transform the dairy subsector to levels that will meet the needs of the Nigerian populace within few years. The primary responsibility of the extension worker is education. There are varied numbers of proven extension/educational methods from which the extension worker can choose from to set up learning situations and maximize the transfer of information and skills to young and adult learners. Extension teaching methods are avenues through which clientele are reached with improved farm practices to empower them for improved level and standard of living. Improving the socio-economic conditions of the target audience within the society is a continuous exercise, which eventually manifests in changing the people's knowledge, attitudes and practices (KAPs).

The choice of choosing the teaching methods that will be most effective in achieving the educational objectives is the responsibility of the extension professional. A major task in agricultural development is the transfer of improved technologies to farmers. Although extension institutions and various sources of information exist in almost every developing country, the coverage of farm families is very limited. A link between farm families and research information is very important. Farinde [3] opined that the process of communication in extension involves the sender who transmits a message or information through a selected channel to the receiver with a resultant effect or feedback. It is in view of this background that this study specifically, described the personal and socio-economic characteristics of the pastoralists and assessed their knowledge on the introduced DPTs. Based on the stated objectives the hypothesis formulated and tested in the study was that there is no significant relationship between the personal and socio-economic characteristics of pastoralists and their knowledge of the DPTs.

Materials and Methods

The study was conducted in Oyo State, Nigeria. It is situated in the South-Western part of the country. The state comprised thirty-three local government areas with approximately 20,000 square kilometers of land area. The state is located between 7° and 9° north of the equator and bounded by the longitudes 2° and 4° east of the Greenwich Meridian. It is bounded by Ogun, Osun, Kwara and Republic of Benin in the South, West, East and North respectively. The average annual rainfall of the area ranges between 1150mm in the derived savannah and 1525mm in the rainforest zone. The vegetation allows for agricultural production which facilitates the engagement of inhabitants, especially rural populace, in crop and livestock production. Inhabitants engage in non-farm activities as well to make ends meet. According to the National Population Commission [4] estimate, Oyo State population is provisionally put at 6,617,720 people. The Yoruba are the predominant inhabitants of the state, with some other tribes from various ethnic groups. The primary occupation of the people is farming which employs an appreciable portion of the entire population.

The sample framework for the study hinged on milk producing households in Fulani settlements around Milk Collection Centers (MCCs). There are four MCCs namely Fashola, Iseyin, Alaga and Maya-Eruwa situated in Oyo West, Iseyin, Itesiwaju and Ibarapa East Local Government Areas respectively. A multistage sampling procedure was used to select respondents for the study. At first stage, two MCCs (Fashola and Alaga) were purposively chosen because of their longer years of operation. Fulani settlements attached to the chosen MCCs are sixty-seven (67). At second stage, using proportionate sampling, forty per cent of the number of Fulani settlements attached to each of the chosen MCCs was used to select 27 settlements. Finally, eight respondents (pastoral households) were purposively sampled from each of the selected settlements, because not all households were engaged in the DDP, which led to a sample size of 216 respondents for the study. Structured Interview Schedule and a combination of Key Informant Interview and Focus Group Discussion were used to elicit quantitative and qualitative information respectively.

Results and Discussion

Socio-Economic Characteristics

Table 1: Distribution of Respondents by personal and socio-economic characteristics.

Variables	Frequency	Percentage	Mean	S D
Age (years)				
<21	6	2.8		
21-30	38	17.6		
31-40	80	37	38.8	9.82
41-50	70	32.4		
51-60	17	7.9		
61 & above	5	2.3		
Years of Residency				
<11	53	24.5		
11-20	25	11.6		
21-30	53	24.5	24.68	12.5
31-40	71	32.9		
>40	14	6.5		
Household size				
<3	15	6.9		
3-6	118	54.7		
7-10	18	8.3	7.02	3.78
11-14	59	27.3		
>14	6	2.8		
Years of formal Education				
0	122	56.5		
1-6	69	31.9	3.39	4.46
7-12	-	-		

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>12	25	11.6		
Dairy Experience				
<11	53	24.5		
11-20	46	21.3	22.81	12.07
21-30	46	21.3		
31-40	71	32.9		
Herd Size				
1-50	136	63		
51-100	34	15.7		
101-150	24	11.1	109.48	215.26
151-200	-	-		
>200	22	10.2		
Number of Lactating cows				
<10	65	30.1		
10-19	111	51.4		
20-29	32	14.8	13.15	7.64
30-39	-	-		
40 and above	8	3.7		
Average Daily Milk Yield (Liters)				
<20	66	30.6		
20-39	99	45.8		
40-59	43	19.9	27.92	16.51
60-79	-	-		
80 and above	8	3.7		
Type of Extension contacts*				
OYSADEP	43	19.9		
DDP/MCC	198	91.7		
University	111	51.4		

SD: Standard Deviation, Multiple responses

Results in Table 1 show that the mean age of respondents was 38.88 years with a standard deviation of 9.82 years. The result agreed with Adeyemo[5] who found that the mean age of milk producers in Oyo State was 37.5 years but varied slightly from the findings of Ojo [6] who reported that the mean ages of male and female involved in cattle rearing in Osun State were 34.05 and 33.33 years respectively. Results in Table 1 also show that the mean household size was 7 people and a standard deviation of 3.78 people. This average relatively large household size of pastoralists agrees with Sodiya [7] who reported mean household size of eight in Fulani settlement in Ogun State, Nigeria. According to Adedipe [8], pastoralists keep a large number of household members because of the labour intensive nature of their means of livelihood, and as such rely on family or household labour for both livestock and arable crop production activities. Results in Table 1 further reveal that over an average of the respondents had no formal education (56.5 %). It shows that a low level of formal education existed among the respondents. This could affect their information seeking habit and record keeping system. This finding is partly in agreement with the findings of Iro [9] that posited that rural cattle rearers do not have formal education. Although, report of UNESCO [10] affirmed that cattle rearing is time consuming and does not give room for school enrollment.

The average length of residency of pastoralists was 24.68 years with a standard deviation of 12.50 years. This finding shows that pastoralists have stayed an average of about two and a half decades in their various settlements and are accustomed to other people who may or not be indigenes of the area of study. This agrees with the findings of Oyesola & Sodiya [7,11] that most Fulani households in Ogun, Southwestern Nigeria were fully sedentary. From Table 1, the mean dairy experience was 22.81(±12.07) years. This implies that the majority of the milk producers were born into cattle rearing and by extension dairy farming. This supports the submission of Ojo [6] that Fulani children are exposed early to grazing of cattle. Farming experience affects farm management and decision-making process [12]. Obviously, an experienced farmer will most likely identify the relative advantage of new, improved technologies over the old, which is the case in the study area. Results in Table 1 similarly show that the mean number of cattle kept by the pastoral household was 109.48 heads. This relatively high herd size could reflect the totality of cattle belonging to individual members of the household. Literature reports that males have higher herd size than females [6,13,14]. Thus, the presence of males and females in the same household would result into a larger number of cattle to be managed. Sodiya (2005) also reported that the gradual increase in herd size after sedentarization of the Fulani for a longer time period is due to the adaptation of cattle to their present agro-ecological system and probably the development of resistance to major cattle diseases that may decimate the herd.

Results in Table 1 further show that about 30 per cent of the pastoralists had less than ten lactating cows. About an average (51.4 %) had lactating cows of between 10 and 19. About 14.8 per cent of the milk producers had lactating cows between 2 to 29. Very few (3.7 %) milk producers had beyond 39 lactating cows. The mean lactating cows was 13.15. The significance of the number of lactating cows is that it is a function of the total yield (milk) that a pastoral household can get, all other things being equal. Hence, the more the number of lactating cows, the greater the likelihood of more milk that the household gets for consumption or sales. Results in Table 1 also show that the average daily milk yield of lactating cows reared by the pastoralists was 27.92 liters. This is, however, a function of lactating cows. From this, an estimation of the Fulani cow milk productivity was about 2.12 liter/lactating cow. This fluctuates based on breed type and seasonal variation. This finding corroborates earlier reports that indigenous breeds of cow kept by Fulani cattle readers have low milk productivity [15,16]. It is therefore not surprising to observe development

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effort geared to improving the low genetic make-up of Nigerian indigenous breeds of cattle. An implication of this low milk yield is that at an aggregated market level, the supply of milk will be low. Consequently, a supply deficit exists. This has serious implications for household, business and the national economy [16].

Results in Table 1 show that about 20 per cent of the respondents indicated that they had contact with the Oyo State Agricultural Development Programme (OYSADEP), while 51 per cent indicated they had contacts with extension from universities. However, the extension arm of the DDP promoters recorded the most frequent visits among the respondents. Nonetheless, every respondent had come in contact with an extension agent at one time or the other. Extension organizations as sources of information on innovative technologies are important in that they can create awareness on technologies, promote technologies (by stimulating interest), supply valid evidences etc. This gives credence to Ekpe & Obeten [17] who found out that the more the regularity/frequency of extension contact between farmers and the extension agents.

Knowledge of Respondents on the Dairy Production Technologies (DPTs)

Results in Table 2 show that a majority (totaling 83.8% and 78.7%) indicated that they knew that grass gathering and drying were essential steps in hay making. However, about 34.7% and 28.7% of the respondents were respectively adjudged to knowing that chopping (of the dried grasses) and treatment with chemical (such as urea) were also the next essentials of hay making. About 20 per cent of the pastoralists knew of crushing by the use of hammer mill or grass crusher. The implication of the findings is that pastoralists' knowledge of hay making as a way of pasture conservation is deficient in chopping and chemical treatment of grasses. With this situation of knowledge deficit, the production of quality hay cannot be guaranteed by the pastoralists. Hence, capacity building and training opportunities will be needed to boost these areas of concern. Obinne [18], described hay as a forage cut, cured or sun-dried, packed and kept for feeding animals such as cattle, sheep and goat, especially in the dry season.

He opined that hay of good quality improves animal nutrition. Hence, knowledge of hay preparation is a prerequisite for making and benefitting from dairy technology. Results in Table 2 also show that 70.8 per cent indicated that they knew of the idea of forage cultivation as an alternative to natural uncultivated pastures. The implication of the finding is that with a majority of the population informed about improved forage cultivation, the reliance on low nutritive pastures coupled with seasonal variation of its availability, pastoralists might tend to consider planting forages. Otherwise, they continue to travel alongside their herd in search of pastures with its known consequences. According to Obinne [18], forage crops constitute the bulk of ruminants feed. He recommended a mixture of grass and legumes to raise the nutritional content of animal feed. Moreover, he maintained that natural grassland has low nutritive value because of overgrazing and grassland crops should be replaced with chosen cultivated pastures in order to prevent low output per unit area.

Table 2: Distribution of Respondents by personal and socio-economic characteristics.

Knowledge items on DPTs	Frequency	Percentage
Feed Conservation (Hay Making)		
Gathering of grasses	181	83..8
Drying	170	78.7
Chopping (with cutlass)	75	34.7
Crushing (using grass crusher or hammer mill)	43	19.9
Chemical treatment (with urea)	62	28.7
Feed supplementation		
Cultivation of improved forage	153	70.8
Use of commercial feed ration	189	87.5
Dairy Inputs and Support services		
Acquiring a crossbred animal	43	19.9
Artificial Insemination services	156	72.2
Veterinary Drugs	94	43.5
Improved Husbandry Practices		
Giving colostrums to newborn calf	216	100
Cleaning calf nostrils with clean cloth	43	19.9
Navel cutting	25	11.6
Treatment with iodine	43	19.9
Use of Oral Rehydration salt or 'Diastop'	150	69.4
Record-Keeping		
Animal health record	0	0
Milk production record	65	30.1
Inputs record	25	11.6
Sales record	204	94.4
Expenditure record	40	18.5

Similarly, results in Table 2 reveal that with the low milk output of indigenous cattle breeds, a very few (19.9%) pastoralists expressed their knowledge of acquiring a crossbred animal (heifer) while a majority (over 70%) indicated their knowledge of Artificial Insemination (AI) services as a way of improving animals' productivity. This might be due to the popularity of AI services as promoted by livestock extension agents. About 43.5 per cent expressed their knowledge of veterinary drugs and services as a

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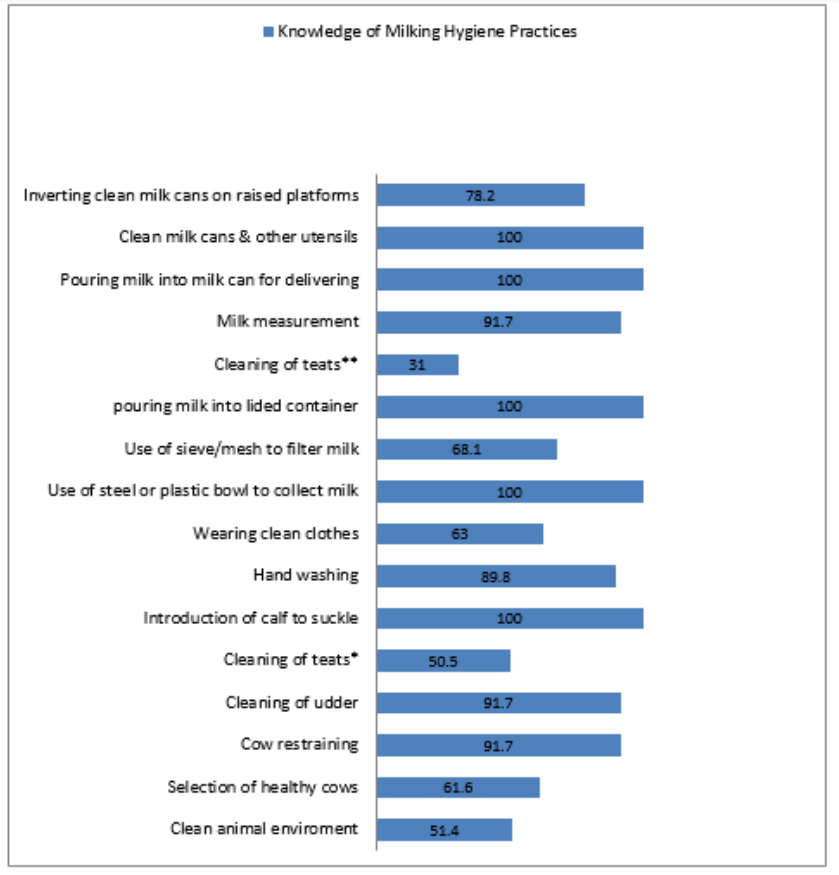
way of boosting dairy production. AI, also referred to as artificial mating, is the introduction of the semen from a male animal into the reproductive tract of the female animal of the same species by the use of instruments, which can be used to reproduce improved animals on a large scale and at comparatively low cost. With these pastoralists were given a new instrument for implementation in the Dairy Development Programme.

Shehu [19] reported that to improve livestock production in Nigeria, technologies such as artificial insemination have to be understood and transferred properly by Livestock Extension Agents (LEAs) to farmers for proper adoption and utilization. Furthermore, results in Table 2 Show that a total of 30 per cent of the respondents were able to indicate milk production record as essential dairy record. While about 94 per cent mentioned milk sales record, only 11.6 per cent indicated their knowledge of input record. While only 18.5% mentioned keeping records of expenditure as essential in dairy business, none (0%) indicated knowledge of animal health record. The findings indicate a low knowledge of dairy record keeping among the respondents. The implication of this situation is that there is too much reliance on human memory. The lack of a 'booking system' that could be referred to when the dairy manager/operator is not around will hinder proper management. For instance, how can one identify a cow currently on medication and the status of its dosage? The under listed excerpts from Focus Group Discussions lend credence to pastoralists' knowledge of the DPTs

…what I know of hay preparation is that we fetch grasses and some shrubs. We leave it to dry and then cut them into small pieces… …After cutting the grasses, we give to the cattle to consume …. FGD participant at Alaga, Itesiwaju L.G.A……As we were taught, after drying and cutting the grasses, you also add chemical such as urea to preserve them before being used for feeding the cattle… FGD participant at Alaga, Itesiwaju L.G.A (Source: Focus Group Discussion, 2016) The position above shows observed differences in pastoralists' knowledge of hay preparation.



Teats*: before milking; Teats**: after milking

Figure 1: Distribution of respondents on the knowledge of milking hygiene practices.

The results of the knowledge of the essentials of hygiene to be observed, before, during and after milking are presented in Figure 1. As regards the essentials of milk hygiene practices, about 51.4 per cent of the pastoralists indicated they knew that the animal environment must be clean prior to milking. Over 60 per cent indicated that cows to be selected for milking must be healthy and not currently on drugs. About 91.7 per cent of the milk producers knew that restraining cow and cleaning of the udder were essential

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prior to milking. However, just an average number of respondents indicated their knowledge of cleaning the teats before milking is done. All the respondents knew that calf needs to be introduced to the cow to suckle after which the milker takes charge of the milking. This is so because of the hand milking system wholly practiced by the pastoralists. In addition, almost 90 per cent of the respondents claimed to know that hand washing prior to milking must be observed by the milker. In addition, all (100%) of the respondents maintained they knew that milk collected should be poured into a container with a lid while milking of other cows is in progress. A fairly above half (68.1%) could remember the use of sieve/mesh for filtering milk. The findings suggest variation in knowledge of milk hygiene before, during and after milking of cow. A situation in which a greater population is deficient in knowledge of cleaning teats of milked cows may predispose producing cows to flies and other insects that could lead to teat infection. Consequently, such act of ignorance may be too costly as an infected cow would not only suffer, but the calf would be denied of nutritious milk from its mother.

According to recent FAO report on Good Dairy Farming Practices, milking hygiene specifically, milking systems or methods must meet hygienic standards. The milker's hands and body, cow udder, milking utensils and milking environment must be clean. According to Layton [20], knowledge is an indispensable organ of technology. "Successful and result-oriented farming requires the knowledge and skill of the farmers, which can only be attained through the right training"- Farinde [21]. Farinde & Ajayi [21] also investigated the training needs of women farmers in livestock production following their knowledge and skill gaps analysis and drew implications for rural development in Oyo State. From the foregoing, pastoralists in the study area have knowledge deficiencies in performing the following dairy production technologies operations; Hay making (crushing and chemical treatment with urea), acquiring a crossbred animal, husbandry practices (cleaning calf nostrils, navel cutting and treatment with iodine), milking hygiene (cleaning of teats of cow after milking), and record keeping (animal health, input record, expenditure). In essence, empowerment of milk producers through adequate training in all the expressed areas of knowledge deficiencies with regard to dairy production is a predisposing factor to sustainable technology adoption and livelihood.

Knowledge level of Respondents on the DPTs

Results in Figure 2 show the categorization of respondents by their knowledge score on the DPTs. The mean knowledge score computed was 20.19 with a standard deviation of 7.57. Using the 'mean score ± standard deviation' approach to group respondents' total knowledge score, overall knowledge of DPTs was categorized into 'high' (above 28 score points), 'moderate' (13-28 score points) and 'low' (less than 13 score points). About 18.5 per cent fell within the low knowledge boundary with a limited aggregate knowledge score of below 13 points. This proportion of respondents knew little about the package of DPTs. On the other hand, there were about 20 per cent of the respondents in the high knowledge category. This indicates that only a few knew much about the package of DPTs. Meanwhile, over half of the respondents (61.6 %) had average knowledge of the package of DPTs. The variation in knowledge levels among pastoralists might be due to differences in the level of formal education, contact with extension agents, DDP training attended and the dairy experience of the milk producers. These findings again underscore the need for training workshop and capacity building for the pastoralists in order to enhance their knowledge about the entire elements in the various components of the package of DPTs.

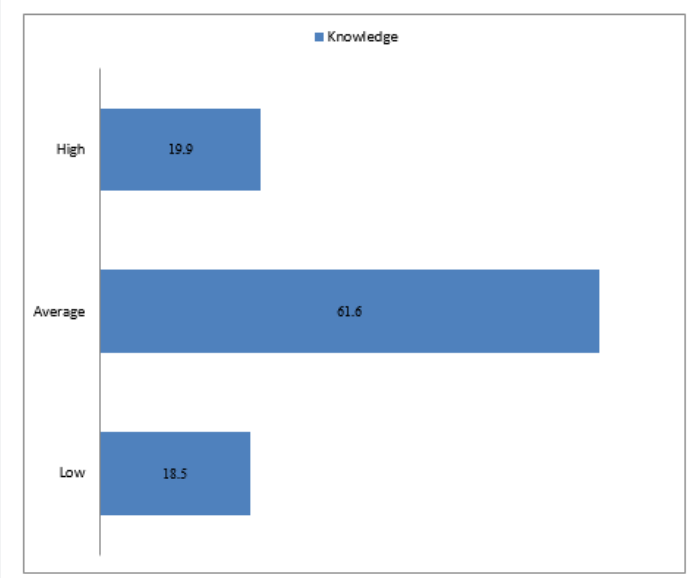

Figure 2: Distribution of respondents by knowledge level about the Dairy Production Technologies.

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Hypothesis Testing

Table 3: Results of correlation analysis establishing relationships between some selected personal and socio-economic characteristics of respondents and their knowledge on DPTs.

Variable	r-value	p-value
Age	-0.348**	0.001
Household size	0.352**	0.001
Years of Education	0.669**	0.001
Length of Residency	-0.039**	0.571
Dairy Experience	-0.288**	0.001
Herd size	-0.240**	0.001
Lactating cows	-0.121**	0.001
Average daily yield	0.380*	0.051
Number of contacts with extension agents	0.615**	0.001

**Significant at $p \leq 0.01$

*Significant at $p \leq 0.05$

Results in Table 3 show that at $p \leq 0.01$, there is a positive and significant relationship between pastoralists' years of education ($r = 0.669$), extension contact ($r = 0.615$) and their knowledge of the DPTs. Correlation analysis also revealed that there was a significant but negative relationship between age ($r = -0.348$), dairy experience ($r = -0.288$), and milk producers' knowledge of the DPTs. This finding suggests that the higher the level of education and more contact with extension agents, the higher the knowledge of DPTs. Conversely, the aged milk producers tend to have low knowledge of the DPTs.

Conclusion

Based on the findings of this study, it was concluded that a large proportion of the respondents were male with female being a minority. Respondents were mostly married and in their productive years. There was low literacy level among the respondents. Milk producers possessed moderate knowledge of the DPTs. Milk producers in the study area have knowledge deficiencies in the following DPTs; hay making (crushing and chemical treatment with urea), acquiring a crossbred animal; husbandry practices (cleaning calf nostrils, navel cutting and treatment with iodine), milking hygiene (cleaning of teats of cow after milking), and record keeping (animal health, input record, expenditure).

Recommendations

It is recommended that there is need for the state Agricultural Development Programme (ADP) to increase its coverage so that a greater population of pastoral communities would benefit from extension activities. Policy makers should incorporate functional literacy programmes into extension services, in order to afford them the opportunity to understand the seemingly complex technologies and thereby increasing their likelihood of adoption of these technologies by making them appropriate. In order to increase their awareness of some of the dairy technologies, sources and channels (means) of information available to milk producers must be intensified. Hence, the use of radio programmes, posters, bulletins, audio-visual aids like documentary films in local languages should be intensified for efficient dissemination of information to pastoralists. The DPTs knowledge areas with identified deficiencies or gaps should be reduced through training workshops and capacity building activities. Increased knowledge will boost confidence in trying and eventually adopting a seemingly complex technology. Finally, the communication of proven innovative dairy technologies should solely be left to agricultural extension and rural sociology professionals that are undoubtedly qualified to not only decode technical information but also encode such into a simpler form for the intended user, in an atmosphere of mutual trust and respect.

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