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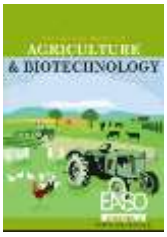

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Original Article

Adoption of Sustainable Dairy Management Practices and its Effect on Farm Income: A Case of Dairy Farmers in Rubaya Sub-County, Mbarara District

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Adoption, Dairy Farmers, Sustainable Practices, Farm Income.

ABSTRACT

Sustainable dairy management (SDM) practices aim to minimize environmental impact, promote animal welfare, ensure economic viability, and support social responsibility throughout the dairy production chain. The SDM practices that could improve sustainability of dairy farming systems in Uganda include milk management, animal health, feeding and breeding practices. Despite the numerous advantages that scientific literature reports for these dairy management practices, they are not always adopted by farmers because of various factors. The objectives of this study were to examine farmers' adoption decisions towards Sustainable Diary Management (SDM) practices, as well as the economic impact of this adoption among dairy farmers in Rubaya Subcounty. The cross-sectional research design was applied to collect both quantitative and qualitative data using a semi-structured questionnaire. Data were collected using a household survey of 160 randomly selected respondents, from different villages within the study area. R Software Version 4.4.0 was used for data analysis. The results reveal that most of the SDM practices were adopted by over 50% of the dairy farmers. Only Artificial insemination, drying off animals, conservation fodder and concentrate feeding practices were adopted by less than 50% of the dairy farmers. The Multivariate logistic regression model results show that the adoption of SDM practices is significantly associated with varied demographic (Gender, age, household size); socio-economic (land size and household income); and institutional factors (access to agricultural credit, access to extension services, and membership to a farmer association). The study found out that adoption of SDM practices increased their farm income by UGX. 2,930,429/=, highly significant at 5% (p=0.02). The study recognizes two main pathways to increase the adoption of SDM practices: i) utilizing farmers' knowledge and information sharing platforms; and addressing broader market and institutional failures.

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INTRODUCTION

Worldwide, the livestock production accounts for about 40% of the agricultural Gross Domestic Product (GDP) (Akzar et al., 2023) and to an estimated 30% of agricultural GDP for the developing countries (Waiswa et al., 2021). As a sub-sector of livestock production, dairy production is important source of livelihood for majority of the smallholder farmers in the developing countries (Abbasi & Nawab, 2021; Janssen & Swinnen, 2019). In Uganda, the dairy sector accounts for more than 19% of the total economic welfare of the national agricultural sector, the main areas of dairy production being the cattle corridor (Waiswa et al., 2021).

A greater understanding of the constraints in smallholder dairy production is needed, as smallholder dairy farmers supply most (estimated at least 80%) fresh milk in developing countries, and increases in income, urbanization and changes in diets have led to an increased demand for fresh milk in developing nations (Muehlhoff & Bennett, 2013). These developments have the potential to improve the incomes and welfare of smallholder dairy farmers. However, smallholder dairy production systems in Sub-Saharan African (SSA) countries are characterized by low productivity and a slow rate of technology adoption (Mekonnen et al., 2010). This is equally the case in Uganda where adoption of dairy technologies and practices has been slow, despite numerous efforts by the Ministry of Agriculture Animal industry and Fisheries (MAAIF), the Diary development authority (DDA) and other stakeholders like SNV, to disseminate the technologies in the past (Waiswa et al., 2021).

Several factors contribute to this low productivity and slow rate of adoption; among them animal disease, livestock nutrition, poor management, lack of infrastructure, and veterinary service provision (Kebebe, 2017; Tschopp et al., 2021). The adoption of modern dairy technologies such as use of improved breeds, improve forage, promoting animal health, and hygiene is important to drive productivity, farmer's profits, welfare of poor farmers and is promising as a driver of rural development and poverty reduction (Janssen & Swinnen, 2019). The productivity is met uniquely through nutritional requirements of dairy cows as the key to improving milk production (Akzar et al., 2023). This can be achieved by adopting dairy feed technologies orpractices such as feeding high-quality forage, providing unrestricted access to drinking water and supplementing diets with high protein concentrates (Daros et al., 2019; Martínez-García et al., 2013).

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There is thus a need for policies that increase technology adoption and agricultural productivity which can significantly reduce poverty (Zegeye et al., 2022). To realize significant productivity gains, multiple adoption of advanced agricultural technologies and better production practices by small holder farmers should be a priority (Ojango et al., 2017), as a pathway out of poverty and food insecurity (Kebebe, 2019; Mekonnen et al., 2010). In addition, growing consumer awareness of food safety risks, food safety legislation and increasing standards of milk quality being demanded by dairy processors has led smallholder farmers to adopt hygienic milking, milk handling and storage practices, biosecurity, and animal health technologies to ensure improved milk quality (Kumar et al., 2016). It is therefore important that farmers adopt multiple technologies including biosecurity, animal health and hygiene technologies and practices that reduce the risk of disease introduction and spread within cattle herds, reducing zoonoses risks, and helping to address antibiotics resistance associated with the overuse of veterinary drugs (Korir et al., 2023; Tschopp et al., 2021).

Statement of the problem

Ugandan dairy sector has undergone several changes is providing employment opportunities to a massive population (Waiswa et al., 2021). Despite large production of milk, there is low productivity of dairy animals attributed to low adoption of sustainable management (SDM) practices by the farmers. The nation still has the potential to meet the growing demand for milk, but the immediate need is to adopt and follow better technologies of dairy farming. The adoption of the SDMPs may significantly reduce the environmental footprint of Ugandan dairy production systems as well as reducing their production costs and, consequently, increasing household income (Kleftodimos et al., 2021).

Despite the numerous efforts by MAAIF, DDA, and other stakeholders like SNV to disseminate these SDMPs, their adoption still remains slow. In addition, few studies have been carried out to document the adoption of SDM practices in Ankole region. In addition, a limited number of studies that have investigated the multiple adoption of these practices in smallholder dairy farms in the study area (Feder et al., 2017).To increase the area's milk output, a judicious strategy of focusing on high yielding breeds, feeding, biosecurity, animal health and hygiene technologies and/or practices should be adopted for considerable dairy development. Before that, it is needed to know the base-line information of existing features of technology adoption by the small dairy farmers and the related constraints to adopt these technologies. The present study is, therefore, is undertaken to examine farmers' adoption decisions towards these new management strategies, as well as the impact of this adoption on milk production and household income.

Objective of study

To examine the factors influencing the adoption of SDM practices among the dairy farmers of Rubaya Sub-county.

LITERATURE REVIEW

The adoption of dairy technologies by farmers varies widely across different agro-ecologies and within the same agro-ecology based on various technical and non-technical factors (Korir et al., 2023). Researchers have studied numerous motivating factors and constraints to adoption by observing the different behaviors between adopters and non-adopters of technology (Ruzzante et al., 2021). They found that the influence of many factors can be explained by; the level of diffusion of the specific technology, the economic constraints of the adopters and the perception of adopters to the technology (Ruzzante et al., 2021).

Technological, economic, institutional, and human specific factors have been found to be key determinants of technological adoption (Mwangi & Kariuki, 2015) coupled with unobserved cultural, contextual, and policy factors (Ruzzante et al.,

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2021). Some of those factors are family size, farming experience, availability of dairy production extension services, availability of cross breed cows, accessibility of saving institutions, total income from milk and milk products. Availability of training on livestock, age of household head and off-farm activity participation played significant roles on both the probability of dairy technology adoption and its level of adoption (Korir et al., 2023).

Higher levels of technology adoption are associated with better milk yield regardless of the breed of cattle (local or crossbred) owned by smallholder dairy farmers (Korir et al., 2023; Mekonnen et al., 2010). Adoption of new practices and technologies is however limited by various factors such as affordability, and limited access to information and training (Akzar et al., 2023), which is a major constraint to quality, and higher milk yields (Burkitbayeva et al., 2019; Janssen & Swinnen, 2019).

According to Akzar et al. (2023), smallholder farmers adopt agricultural technologies if the benefits of adoption are higher than the costs of the technology, which is subject to resource constraints, such as land, labor, and capital. Similarly, farmers adopt technologies or technology bundles when the expected benefits outweigh the costs (Kassie et al., 2013; Manda et al., 2016; Mensah et al., 2021). Several empirical studies have found that the adoption of a bundle of agricultural technologies has a significantly greater effect on farm performance than the adoption of an individual technology. For instance, the adoption of improved maize varieties in combination with conservation agriculture practices (Khonje et al., 2018), improved maize varieties in combination with legume rotation and residue retention practices (Manda et al., 2016) and sustainable intensification practice packages including fertilizer, maize and legume diversification and soil and water conservation (Marenya et al., 2020) has resulted in higher crop yields.

Adopting feed technologies in bundles has the potential to enhance milk production on smallholder dairy farms (Akzar et al., 2023). High-quality grass varieties, such as *Brachiaria brizantha*, *B. Mulato* and *B. mutica*, which have shorter growth periods, can lead to increased grass yields and better nutritional content, resulting in the availability of quality forage (Akzar et al., 2023). Adoption of fertilizers to grow grass boosts grass yield, thereby increasing forage availability. By adopting improved grass varieties and fertilizers as bundles, the availability of nutritional forage can be improved, which can have a positive effect on milk production (Akzar et al., 2023).

Additional benefits in milk production are expected when unrestricted access to drinking water is added to the bundle, which provides an adequate water supply to improve dairy cow body weight and dry matter intake (DMI), leading to a higher level of milk production (Akzar et al., 2023). DMI is the amount a cow consumes per day after subtracting moisture content from the wet feeds. Furthermore, supplementing feed with high crude protein (CP) concentrates (16% CP or higher) can complement the nutrients from forage and ensure sufficient protein, energy, and minerals, resulting in additional benefits for milk production (Akzar et al., 2023).

Smallholder dairy farmers who adopt a bundle of feed technologies, including high quality grass varieties, fertilizers, unrestricted access to drinking water and supplementation with high crude protein concentrates, are expected to produce higher levels of milk than those who adopt individual technologies and those who do not adopt any of these technologies. Furthermore, the effects of technology bundle adoption on milk production are expected to vary depending on the specific mix of technologies included in the bundle (Akzar et al., 2023).

METHODOLOGY

Research design

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The cross-sectional research design was used since it provides a better understanding of the research problem than either approach alone (Creswell, 2011). Data was gathered using both a semi-structured questionnaire and key informant interviews. The facts and opinions of the key informants enabled the researcher in cross-checking of multiple data sources that increased trust in the validity of the study conclusions (O'Cathain et al., 2010).

Sampling techniques and methods

The study targeted dairy farmers. Random selection of respondents was done in the villages of all the four parishes of the study area. The purposive sampling method was used in the selection of key informants i.e., the ASPs and CBFs.

Sample size determination

The sample size was determined by Kish (1965) formula

$$n = p \times q \times Z^2 \quad (1)$$

e

Where: n = Sample size; p = population involved in livestock production = 33% = 0.33; q = young population and those involved in other ventures = 62% = 0.62; e = standard error = 5% = 0.05; and Z = Z value of 95% confidence = 1.96 from the Z-table. Substituting the values into the formula:

1.96 2

$n = 0.33 \times 0.62 \times 0.05 \times 160$.

Data Collection

A semi-structured questionnaire was used to collect the data and was based on the identified research gap following a structured literature review on dairy production and technology adoption in the Ugandan context. The questionnaire included sections about farmer socio-economic characteristics, SDMPs adopted and possible drivers and constraints to SDMPs adoption.

Data Analysis

The collected quantitative data was entered into Microsoft excel, cleaned, and coded. It was then subjected to using R software (R Core Team, 2023) for analysis. Data analysis encompassed both descriptive statistics and inferential statistics depending on the objectives of the study. The detailed information on the analyses per objective are as follows; -

Descriptive Analysis

This was done to identify the different SDM practices adopted by the dairy farmers. The quantifiable information gathered was analyzed descriptively and then presented in the tables as frequencies and percentages. The Chi square values as well as the p-values were also computed and included in the tables.

Regression Analysis

This was done to examine the factors associated with the adoption of SDM practices among dairy farmers. In this study, the researcher assumed that a farmer would consider adopting a practice if the expected benefit of adoption is higher than non-adoption. The Multivariate Logistic Regression Model (MLRM) was used in this study, where the practices were categorized into; Milk management practices (full hand milking, drying off animals, and allowing calves to suckle before and after milking; (ii) Feeding practices (i.e., conservation fodder, mineral mixture, and concentrate feeding (iii) Animal health management practices (i.e., Following deworming measures and timely vaccination, Consulting veterinary doctors for the treatment of sick animals, and Isolating sick animals from healthy ones; and (iv) Breeding practices (i.e., Artificial insemination, Selection of breeding bull considering its milk yield, and Proper heat detection by visualizing animal behaviors). Four MLRMs

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were run according to these four categories of SDM practices and the results are presented in the tables.

Assessing the effect of adoption

To assess the effect of adopting SDMPs on farm income of dairy farmers in the study area, the farm incomes of the dairy farmers (adopters and non-adopters) were compared to check if there were significant differences basing on p-values.

Ethical Considerations

The researcher employed ethical approaches documented by (Lichtman, 2013) as a guideline. Firstly, the ethical approval for the study was obtained from the Research and Ethics Committee of Bishop Stuart University. At the onset of data collection, the researcher obtained approval from village leaders and finally a written informed consent was obtained from each participant after giving a description of the study before actual data collection. Participants were guaranteed confidentiality of the information they provide. This was preceded by thorough explanation of the aim and objectives of the study. Participation was based on informed and voluntary consent. Respondents for the study were informed of their right to withdraw from the study at any time they deemed it necessary. They were fully assured of their confidentiality and anonymity. Confidentiality of data was maintained by use of identification numbers rather than names and limiting access to the data.

RESEARCH FINDINGS

Factors influencing the adoption of SDM practices

The factors influencing farm households' adoption of SDM practices. The statistical relationships between the dependent variable (i.e. adoption of selected SDM practices) and explanatory variables (i.e. social network, institutional and socio-demographic characteristics) were estimated using the Multivariate Logistic Regression Model (MLRM) using the R Software version 4.3.3. The MLRM was fit using the *lm()* function from the *stats* package (R Core Team, 2024).

Sustainable Milk Management Practices

To assess the factors influencing adoption of milk management practices, a MLRM was run for all the three practices i.e., full hand milking, drying off animals and allowing the calves to suckle before and after milking. The results are presented in Table 4.

The use of full hand milking practice was negatively and significantly influenced by gender, household size and membership to a farmer association. Being a male reduces the likelihood of practicing full hand milking of dairy animals (*p=0.003*) in the study area, significant at 1%. As the household size increases, the likelihood of practicing full hand milking reduces significantly (*p=0.021*) at 5%. Being a member to a farmer association also significantly reduces the likelihood of adopting the full hand milking practice (*p=0.003*) at 1%.

Drying off lactating animals was found to be positively and significantly influenced by age (41 years and above) and land size; and was negatively influenced by household size and access to extension services. The likelihood of drying off animals among farmers significantly increases with age, those above 41 years.

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Table 4: Factors influencing the adoption of SDM practices – Milk Management Practices

Variable	Full hand Milking	Drying off animals	Allowing calves to suckle
(Intercept)	1.990***	1.128 ***	2.184***
	(0.193)	(0.124)	(0.211)
Gender (Male)	**-0.229****	0.015	-0.007
	(0.077)	(0.050)	(0.085)
Age (31 – 40)	0.154	0.004	**-0.422***
	(0.153)	(0.098)	(0.167)
Age (41 – 50)	0.101	**0.260***	**-0.519****
	(0.157)	(0.101)	(0.172)
Age (Above 50)	0.209	**0.243***	**-0.455****
	(0.157)	(0.101)	(0.171)
Education level – Primary	-0.017	0.060	0.138
	(0.083)	(0.053)	(0.090)
Education level – Secondary	-0.045	0.070	0.057
	(0.088)	(0.057)	(0.097)
Education level – College	0.103	0.055	0.149
	(0.105)	(0.068)	(0.115)
Land size	0.003	**0.006*****	-0.000
	(0.002)	(0.001)	(0.020)
Household income	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Household size	**-0.056***	**-0.058*****	**-0.068***
	(0.024)	(0.015)	(0.026)
Access to agricultural credit - *Yes*	-0.004	0.053	**0.506*****
	(0.087)	(0.056)	(0.095)
Access to extension services - *Yes*	-0.054	**-0.190*****	-0.082
	(0.083)	(0.053)	(0.091)
Membership to farmer association - *Yes*	**-0.240****	-0.078	**-0.210***
	(0.081)	(0.052)	(0.088)
Access to livestock production information – *Yes*	0.016	0.044	0.111
	(0.071)	(0.045)	(0.078)
R	0.248	0.345	0.314
Ad2 j. R^2	0.176	0.282	0.248
Number of observations	160	160	160

Significance codes: *p<*0.05*; **p<*0.01*; ***p<*0.001 Values in parentheses are standard errors.*

Allowing calves to suckle before and after milking was found to be negatively and significantly influenced age and household size whereas access to extension services had a positive and significant influence.

Sustainable Dairy Feeding practices

To assess the factors influencing adoption of dairy feeding practices, a MLRM was run for all the three practices i.e., Conservation fodder e.g., hay and silage; Mineral mixture; and Concentrate feeding to lactating animals. The results are presented in Table 5.

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Table 5: Factors influencing the adoption of SDM practices – Feeding Practices

Variable	Conservation fodder e.g., hay and silage	Mineral mixture	Concentrate feeding to lactating animals
(Intercept)	1.449 ***	1.816 ***	1.879***
	(0.173)	(0.168)	(0.161)
Gender (Male)	0.125	0.009	0.091
	(0.070)	(0.068)	(0.065)
Age (31 – 40)	**-0.406****	**0.265***	-0.150
	(0.138)	(0.134)	(0.128)
Age (41 – 50)	-0.271	**0.543 *****	-0.020
	(0.141)	(0.138)	(0.131)
Age (Above 50)	-0.229	**0.611 *****	**-0.323***
	(0.141)	(0.137)	(0.131)
Education level – Primary	0.131	**0.010***	0.076
	(0.074)	(0.072)	(0.069)
Education level - Secondary	0.053	0.063	0.107
	(0.079)	(0.077)	(0.074)
Education level – College	0.059	0.103	-0.046
	(0.095)	(0.092)	(0.088)
Land size	0.000	**-0.008 *****	0.001
	(0.002)	(0.002)	(0.002)
Household income	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)
Household size	0.043	-0.036	-0.043
	(0.022)	(0.021)	(0.020)
Access to agricultural credit - *Yes*	0.190	-0.028	0.280
	(0.078)	(0.076)	(0.072)
Access to extension services – *Yes*	0.121	-0.073	-0.031
	(0.072)	(0.072)	(0.069)
Membership to farmer association – *Yes*	-0.259	0.084	0.119
	(0.072)	(0.070)	(0.067)
Access to livestock production information - *Yes*	0.020	-0.005	0.030
	(0.064)	(0.062)	(0.059)
R^2	0.449	0.373	0.244
Adj. R^2	0.396	0.313	0.171
Number of observations	160	160	160

Significance codes: *p<*0.05*; **p<*0.01*; ***p<*0.001 Values in parentheses are standard errors.*

The conservation of fodder in form of hay and silage was negatively and significantly influenced by age (below 40 years). Feeding dairy animals on mineral mixture was found to be positively and significantly influenced by age and education level (Primary) but was negatively influenced by land size. Concentrate feeding of lactating animals was found to be negatively and significantly influenced age (above 50 years).

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Sustainable Health Management Practices

To assess the factors influencing adoption of health management practices, a MLRM was run for all the three practices i.e., Following deworming measures and timely vaccination; Consulting veterinary doctors for the treatment of sick animals; and Isolating sick animals from healthy ones. The results are presented in Table 6.

The practice of following deworming measures and timely vaccination was found to be positively and significantly influenced by Age (41 – 50) as well as land size. Consulting veterinary doctors for the treatment of sick animals was positively and significantly influenced by age (41 years and above), education level (primary) and land size

Table 6: Factors influencing the adoption of SDM practices – Health management practices

Variable	Following deworming measures and timely vaccination	Consulting veterinary doctors for the treatment of sick animals	Isolating sick animals from healthy ones
(Intercept)	1.309***	1.095***	0.00 ***
	(0.240)	(0.200)	(0.21)
Gender (Male)	-0.071	-0.108	0.000
	(0.096)	(0.080)	(0.000)
Age (31 – 40)	0.314	0.233	-0.000
	(0.191)	(0.159)	(0.000)
Age (41 – 50)	**0.478***	**0.417***	-0.000
	(0.196)	(0.163)	(0.000)
Age (Above 50)	0.329	**0.469****	-0.000
	(0.195)	(0.163)	(0.000)
Education level - Primary	-0.037	**0.176***	0.000
	(0.103)	(0.086)	(0.000)
Education level - Secondary	-0.086	0.131	-0.000
	(0.110)	(0.092)	(0.000)
Education level - College	0.041	0.089	0.000
	(0.131)	(0.109)	(0.000)
Land size	**0.006***	**0.009*****	0.000
	(0.003)	(0.002)	(0.000)
Household income	0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)
Household size	-0.041	0.018	0.000
	(0.030)	(0.025)	(0.000)
Access to agricultural credit - *Yes*	-0.016	0.061	0.000
	(0.108)	(0.090)	(0.000)
Access to extension services - *Yes*	-0.034	-0.007	0.000
	(0.103)	(0.086)	(0.000)
Membership to farmer association - *Yes*	-0.095	0.063	0.000
	(0.100)	(0.084)	(0.000)
Access to production information - *Yes*	0.101	0.009	0.000
	(0.088)	(0.074)	(0.000)
R	0.103	0.265	0.502
Ad2 j. R^2	0.017	0.194	0.453
Number of observations	160	160	160

Significance codes: *p<*0.05*; **p<*0.01*; ***p<*0.001. Values in parentheses are standard errors.*

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Sustainable Breeding Practices

To assess the factors influencing adoption of breeding practices, a MLRM was run for all the three practices i.e., Artificial insemination, Selection of breeding bull considering its milk yield and its phenotypic characteristics, and Proper heat detection by visualizing animal behaviors. The results are presented in Table 7.

Table 7: Factors influencing the adoption of SDM practices – Breeding Practices

Variable	Artificial insemination	Selection of breeding bull considering its milk yield	Proper heat detection by visualizing animal behaviors
(Intercept)	1.034***	1.306***	1.863***
	(0.146)	(0.243)	(0.168)
Gender (Male)	0.071	0.032	-0.025
	(0.059)	(0.097)	(0.067)
Age (31 – 40)	0.000	-0.084	**0.306***
	(0.116)	(0.193)	(0.133)
Age (41 – 50)	-0.014	-0.098	**0.554*****
	(0.120)	(0.198)	(0.137)
Age (Above 50)	-0.031	-0.160	**0.601***
	(0.119)	(0.198)	(0.136)
Education level - Primary	0.040	-0.019	0.028
	(0.063)	(0.104)	(0.072)
Education level - Secondary	-0.027	0.018	0.083
	(0.067)	(0.111)	(0.077)
Education level - College	0.043	-0.094	0.125
	(0.080)	(0.132)	(0.092)
Land size	-0.002	-0.003	**-0.009*****
	(0.002)	(0.003)	(0.002)
Household income	**0.000***	0.000	0.000
	(0.000)	(0.000)	(0.000)
Household size	0.006	0.055	-0.053
	(0.018)	(0.030)	(0.021)
Access to agricultural credit - *Yes*	-0.070	0.016	-0.025
	(0.066)	(0.109)	(0.075)
Access to extension services - *Yes*	-0.096	-0.128	-0.012
	(0.063)	(0.105)	(0.072)
Membership to farmer association - *Yes*	-0.022	-0.068	0.086
	(0.061)	(0.102)	(0.070)
Access to livestock production information *Yes*	0.016	-0.078	0.007
	(0.054)	(0.089)	(0.062)
R^2	0.082	0.378	0.378
Adj. R^2		-0.006	-0.011
Number of observations		160	160

Significance codes: *p<*0.05*; **p<*0.01*; ***p<*0.001; Values in parentheses are standard errors.*

The adoption of artificial insemination was found to be positively and significantly influenced by household income. Proper heat detection by visualizing animal behaviors positively and significantly influenced by age, and negatively influenced by land size.

Conclusions

Most of the SDM practices are already in use by smallholder farmers on their farms. Only a few i.e., artificial insemination, drying off animals, conservation fodder and concentrate feeding

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practices were adopted by less than 50% of the dairy farmers. Gender, age, household size); socio-economic (land size and household income); and institutional factors (access to agricultural credit, access to extension services, and membership to a farmer association were the significant factors influencing the adoption of SDM practices in the study area. The adoption of SDM practices significantly contributes to increased livestock production, translating into increased farm incomes among the dairy farmers in the study area.

Recommendations

Firstly, training farmers on different SDM practices should be a top priority of the government and development partners. In addition to this, there is a need to build the capacity of the extension agents by retooling through refresher/in-service courses on the current livestock production practices, who can then pass on this information and knowledge to farmers.

There is need to encourage formation and support of farmer associations so as to ease dissemination of knowledge and information since the extension to farmer ratio is low.

Finally, there is a need to critically analyze the obstacles to adoption of SDM practices so that necessary steps are taken to facilitate adoption. This calls for collective action at the community level and supportive policies and investments at district, regional and national stages to best unlock the potential of smallholder dairy farming in the study area and Uganda at large.

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