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Comparison of Electronic Cow Record (REKS-EL) Feature with Recording Components Used by Dairy Farmers in Sleman Regency, Yogyakarta

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ABSTRACT

The study was conducted in 60 respondents of dairy farmers in Sleman Regency, Yogyakarta from August 2020 to February 2021. The study aims to make comparison between recording in the REKS-EL version 1.0 and those in dairy farms recording, in order to improve REKS-EL features. Data of the farmer characteristics and recording components were collected by interviewed. Identification of components the dairy farmers recording was carried out using a list of questions in a table. The list contains 43 components, which were arranged based on the recording guidelines as written in the Indonesian Minister of Agriculture No. 100, 2014. The result of comparison between dairy farmers recording and REKS-EL version 1.0 feature showed differences on recording content. Software REKS-EL has more recording components than dairy farmers recording, as much as 23 vs. 13 (46% vs. 23% of total components). The REKS-EL feature showed advantages on data of pedigree, and reproduction but needs to be improved with the additional components derived from farmer records, namely daily and weekly milk production. In the REKS-EL feature also needs to be added feed data, body condition score and calf after birth.

Keyword: Comparison, Dairy cow, Recording, REKS-EL

Introduction

Livestock recording is an important tool in dairy cow management. However, the attention of farmer on record keeping is still low. According to Purwaningsih and Kia (2018), the purpose of record keeping in the dairy farming is to provide complete and detail data of individual cow, as the basic of daily decision, to evaluate the current management and for making long term planning. Referred to Makin (2011), the implementation of record keeping by dairy farmers in several regions of Indonesia was done by followed the guideline of Dairy Cooperative and Local Livestock Service. Desviani *et al.* (2020), reported that dairy farmers in Sleman Regency of Yogyakarta used several types of media, book, paper, card, and board to record the data. The variation of recording media found in the farms caused differences in the form and content or written information in the recording. Apart of that, farmer characteristics in the different regions also have possibility to affect the number of data or components in the dairy record. Related to this condition, there is need to provide a certain type of recording media which helpful for farmers to keep and process the data during the management of dairy cow.

Electronic Cow Recording version 1.0 (REKS-EL version 1.0) is one of the android-based software. This software was prepared following the guideline of Good Dairy Breeding (Indonesian Minister of Agriculture No. 100, 2014) and also by including data on the maintenance of dairy cows which commonly written in the farm recording. This software has been developed as a recording media to facilitate uniformity data in the farmer level and already had Intellectual Property Rights. Electronic Cow Recording version 1.0 has been successfully implemented to record data of dairy farms in Pujon area of East Java. The software was focused on keeping and processing data of pedigree and reproductive performance of dairy cow.

The utilization of REKS-EL as a recording media needs to be expanded in other regions to make it more beneficial for farmers. As consequently, the feature needs to be improved by combining several data which were obtained from farmers recording. Therefore, there is need to identify farmer characteristics, record keeping purposes and data or type of components which were used in the dairy farm recording. The study was carried out in Sleman Regency, Yogyakarta Special Region. The place was selected because it has high population of dairy cows, and farmers already implemented record keeping. The collected data from dairy farms recording in that area would be used as data base to improve REKS-EL software version 1.0 to increase its utilization.

Materials and Methods

The study was conducted in Sleman Regency from August 2020 to January 2021. The respondent was 60 dairy farmers, members of the Sarana Warga Sejahtera Secondary Cooperative. Respondents were taken by purposive sampling, with the provision that farmers are active member of the cooperative, has been keeping dairy cows and using recording for 5 years. Material of study consists of questionnaire, REKS-El software version 1.0, camera and dairy cow recording belongs to farmers.

The study has collected data of the farmer characteristics and components or data which were recorded by farmers. Farmer characteristic was obtained by interviewing respondent using questionnaires. Identification of components (data) in the dairy farmers recording was carried out using a list of questions in a table. The list containing 43 components, which were arranged based on the recording guidelines as written in the Indonesian Minister of Agriculture No. 100, 2014. Farmers were required to fill a tick symbol (√) for each recording component which was used in their recording and minus (-) for an unrecorded component. The obtained data were calculated to determine the range of maximum and minimum value. Based on the calculation the minimum value was found as 21 (Table 1). The component of recording was categorized as data recorded by farmers if it was chosen by 21 respondents (showed 21 tick symbols (√) in the list), and categorized as unrecorded if the number of (√) was less than 21. Data were statistically analyzed by descriptive analysis and correlation.

Table 1. Rate of used (√) or not used (-) recording component by farmers

Rate	rate ratio	Description
Max	21	used
Min	21	not used

Results and Discussion

Characteristics of dairy farmers in Sleman Regency

Samples (respondents) in this study consisted of dairy cow farmers, who were organized by milk cooperatives in Sleman Regency (Table 2). Data in Table 2 indicated that respondents are members of 4 milk cooperatives. The location and difference of regulation of each milk cooperative might be affecting farmer's character. According to Suherman and Sutriyono (2021), the characteristic of farmers as manager determines the success rate of a livestock business. To find out the ability of farmers there is need to identify their specific character, especially which related to dairy cow management, such as age, education level and experience.

Table 3 showed 95% of samples are farmers under the age of 50 years. The study also found that number of cow owned by farmers could be classified as 3 to 10 (81%), 11 to 20 (14%), 20 to 30 (3%) and more than 30 head/family (2%). The data indicated that majority farmers in this place kept more than 3 dairy cows. Based on the age and number of cow ownership could be shown that recording was important in dairy farm management in this location. Nurdyansyah *et al*. (2020) informed, age and experience of dairy cow management affected the ability of working, taking decisions and evaluating business governance, while level of education affected the way and mindset of farmers in making decisions, adopting new knowledge and proficiency. In this study, the age of farmers showed an advantage. Since majority farmers are young, could be expected good adoption to technological developments, including the use of electronic recording to record data in the dairy farm with smartphone facilities.

In generally, dairy farms in Sleman region are categorized small holders because 81% of farmers owned ≤10 dairy cows and 19% of those had ≥10. Scale of ownership by farmers has an impact on duration of record used. The data statistically showed a positive correlation between the experience time on managing dairy cow and the implementation of record keeping, however the coefficient of correlation value was low (r= 0.15). This result indicated that the utilization of recording was not affected by experience. Thus, new farmers probably earlier implemented record keeping rather than long experienced farmers.

Comparison of recording components used by farmers with Feature of REKS-EL version 1.0

The implementation of recording by farmers in Sleman regency showed variation in the utilization of media and components or data recorded. Generally, the data were written on the paper (book or card) and board. With such media the components or data recorded by farmers were limited (Desviani *et al.*, 2020). Therefore, a type of recording, which capable to keep high quantity data and easy to apply, for example digital recording that accessible with smartphone is necessary to be introduced to farmers.

Data in the dairy farm recording could be used as data base to improve the existing electronic recording system, such as REKS-EL version 1.0. In this study, the record components or data found in the dairy cow recording was compared with the features of electronic recording (REKS-EL version 1.0).

The comparation (Table 4) was objected to find out the types of components of REKS-EL version 1.0 that was need to be improved. Software REKS-EL version 1.0 has 3 main menus, namely add cow data, see cow data and about applications. The existing record-setting feature in REKS-EL version 1.0 software is 23 components. There are 5 main recording data in the software, namely pedigree, production, reproduction, feed, and animal health. Each recording data respectively has 11, 1, 9, 2, and 3 components.

Table 2. Distribution of respondent based on the membership of milk-cooperative in Sleman Regency

Name of milk cooperative	Number of respondents	Percentage of total respondents
Sarono Makmur	17	28
UPP-Kaliurang	13	22
Warga Mulya	8	13
Samesta	22	37
Total number	60	100

Table 3. Characteristics of farmer samples

Characteristics	Criterion	Total sespondents	Percentage (%)
Age (year)	20- 30	8	14
	31- 40	39	65
	41-50	10	16
	≥ 50	3	5
Formal education level	Not finish	2	3
	Primary	27	45
	Secondary	18	30
	High	8	14
	University	5	8
Experience of keeping dairy cow (year)	5-10	9	15
	11-15	19	32
	16-20	4	7
	≥ 20	28	46
Experience on record keeping (year)	5-10	10	16
	11-15	18	30
	16-20	8	14
	≥ 20	24	40
Total number	60	100	

Based on the comparation (Table 4), in the dairy farmers recording was found 13 components, while in REKS-EL version 1.0 feature was 23. Those equivalent with 26% and 46% of record components of recording guideline, which totally contained 43 components (Indonesian Minister of Agriculture No. 100, 2014). Table 4 also showed 9 components existed in the REKS-EL feature but were not found in dairy farmers recording. Based on this comparation, the REKS-EL feature was more complete than recording belongs to farmers. This result indicated the advantage of REKS-EL as a recording media. However, the result also found 4 components that were recorded by farmers but was not used in the REKS-EL. In the feature of software REKS-EL could be added those components, so that make it more appropriate to be implemented by farmers.

Recording components available in the REKS-EL features but were not recorded by farmers

In compared with REKS-EL feature, the main data that was not found in the dairy farmer recording is pedigree. Those data consisting of the name and cow number, date of birth, breed, sire or straw number, reproductive status, hair color and photograph. Murfiani and Fini (2018) informed, pedigree data are used to keep information about physical and genetic of the dairy cow. The existence of pedigree components in the REKS-EL feature were useful to support the management of breeding and selection, therefore were recommended to be recorded by farmers.

The reproduction data in the REKS-EL feature were known un-completely used by farmers. Those recording components, namely type of mating, semen code, date of pregnancy and estrus cycles were not written by farmers because of difficulty on identification and measurement. However, types of mating, semen code and date of pregnancy were recorded by inseminator. Those data actually were available but need to be included in the recording. Makin and Suharwanto (2012) reported, reproductive performance record is useful for evaluating reproductive efficiency and determining the success of the pregnancy. Referred to Nurjanah *et al*. (2013), reproductive management is very important to increase livestock productivity. The result of comparation indicated that REKS-EL version 1.0 has advantage on the reproductive data components, which are important to support sustainability of the dairy farm.

The animal health or vaccination record are available in the REKS-EL feature, including data of date, type of service and responsible personal officer. Vaccination record was done to control the health of dairy cows in the farm. Kurniawati *et al.* (2010) informed, this type of record was required in farm as an effort to prevent the spread of disease caused by livestock transfer.

Recording components used by farmers but did not available in REKS-EL feature

Table 4 showed daily and weekly milk production data, which were recorded by farmers, but did not exist in REKS-EL feature. Farmers recorded daily milk production because it is part of responsibility to milk cooperatives. Daily production record is basic data to calculate income from milk. In addition, this data also useful to evaluate milk production of individual cow per lactation. Nurhayu *et al.* (2017) reported, daily and weekly milk production records can be used to evaluate and predict milk production during lactation. Based on this study result, daily production is important as data to be added in electronic recording feature. Other recording

Table 4. Comparison of components in the dairy farms record and in REKS-EL features

Data recording	Components of data recording	Dairy farmers recording	REKS-EL version 1.0
Pedigree	Name of cow	-	√
	Cow number	√	√
	Date of birth	√	√
	Breed	-	√
	Parent number	-	√
	Sire/Straw number	-	√
	Reproductive status	-	√
	Dominant skin color	-	√
	Cow picture-right side view	-	√
	Cow picture-left side view	-	√
	Cow picture-upper side view	-	√
	Udder shape	-	-
Production	Daily milk production	√	-
	Weekly milk production	√	-
	Monthly milk production	-	-
	Body appearance	-	√
	Monthly growth	-	-
	Annual growth	-	-
Reproduction	Type of mating	-	√
	Date of insemination	√	√
	Semen code	-	√
	Date of pregnant	-	√
	Date of pregnancy inspection	√	√
	Service/Conception	√	√
	Calving Interval	√	√
	Estrus cycle	-	√
Feed	Type of feed	-	-
	Feeding	-	-
Body condition	Body condition score	-	-
	Growth rate curve	-	-
	Reproductive efficiency curve	-	-
Calf record	Date of birth	√	-
	Birth weight	√	-
	Gender	-	-
	Type of birth	-	-
	Condition of birth	-	-
	Date of weaning	-	-
	Body weight at weaning	-	-
Vaccination/animal health	Service date	√	√
	Type of service	√	√
	Name of officer in duties	√	√
Livestock mutation	Cow in	-	-
	Cow out	-	-

(√) recording used by farmers, (-) recording not used by farmers.

component, namely date of birth and birth weight of calf were also recommended to adjust the feature. Dewantri and Oka (2020) informed, recording of birth weight is an important factor in the growth and survival of calf.

The record component both in farmers recording and REKS-EL feature

The results of this study showed similarities between components in the farmers recording and those in the REKS-EL feature. Table 4 showed 9 components listed on both types of recording, namely the identity and date of birth of cow, the date of mating, the date of pregnancy inspection, service per conception, calving interval and health service data. The similarity indicated that REKS-EL has potentially to be accepted and implemented by farmers, because some data have already known by farmers.

The identity of the farmer and dairy cow in the farm is important as evidence of the ownership of dairy cows. According to Anggraeni and Elmy (2016), pedigree recording is used to identify livestock individually and in herd, the physical form, genetic and identification of the body. The result of comparation found similarity of the reproductive record components in both types of recording. Mating date, pregnancy inspection date, service per conception (S/C) and calving interval (CI) were important data for the sustainability of dairy farming business. Those data were used by both REKS-EL feature and farmers, so that basically accepted to be implemented in the recording.

Record components un-recorded by farmers and REKS-EL

The recording components that are not listed in both types of recordings are data of udder, monthly milk production, feed, body condition (BCS) and calf records, especially body weight of calf. The data relates to the evaluation of milk production, feeding management, and calf growth rate. Pribadiningtyas *et al.* (2012) reported, udder shape is a factor that determines milk yield. Ideally, udder is large, symmetric and has 4 teats. In this study, the shape of the udder still not include as record component. This data as well as BCS, as monthly and annual milk production were considerably added in the improvement process of recording electronic.

Monthly and annual milk production is important for evaluating lactation curves, persistence and total milk production (Haryati *et al.*, 2019). According to Awan *et al.* (2016), monthly and annual milk production become a guideline to achieve high production and reproduction of each lactation cycle. Munawaroh *et al.* (2020) reported, BCS recording aims to evaluate the condition of the body over time in relation to reproductive performance. Related to calf record, Prasojo and Kusdiantoro (2010), explained that date of birth is needed as the initial data for starting the development of dairy cattle business. The recording of calf is useful to know the pedigree, growth rate and ability to survive. Recording of livestock displacement also needs to be included in the record as an effort to control and manage the number of cows in an area.

Conclusions

Dairy farmers in Sleman 81% consists of farmers under the age of 50 years. The correlation between the experience on keeping dairy cow and implementation of recording was low. The comparison between dairy farmers recording and REKS-EL version 1,0 feature showed differences on recording content. Software REKS-EL has more recording components than dairy farmers recording, as much as 23 vs. 13 (46% vs. 23% of total components of recording guideline). The REKS-EL feature showed advantages on data of pedigree, and reproduction but needs to be improved with additional components derived from farmers records, namely daily and weekly milk production. In the REKS-EL feature also needs to be added feed data, BCS and calf after birth.

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