Prevalence and Risk Factor of Repeat Breeder Syndrome in Dairy Cows in KUD Bebarengan Anggayuh Tentrem Urip, Batu City, East Java Province

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ABSTRACT

This study aims to contribute valuable insights to readers and serve as a reference for dairy farmers looking to enhance their operations. By examining the prevalence and risk factors associated with repeat breeder syndrome in dairy cows within the Village Unit Cooperation (KUD) Bebarengan Anggayuh Tentrem Urip, Batu City, East Java Province, this study aims to aid in preventing such occurrences and ultimately improve dairy cow productivity. The survey method was employed, utilizing data sourced from cooperative and farmer records, as well as observations, interviews, and questionnaire responses. Analysis revealed that out of 50 farmers owning a total of 281 cows, 30 farmers possessed a combined total of 58 dairy cows classified as repeat breeders. Consequently, the prevalence rate of repeat breeders among farmers was found to be 20.64%. Descriptive analysis was conducted on the collected data, with additional SPSS Chi-Square (X^2) analysis performed to identify risk factors associated with repeat breeders. These risk factors include breeder experience, knowledge of reproduction and estrus phases, communication with artificial inseminators and veterinarians, housing conditions, as well as factors related to livestock feed and water.

Key Words: Dairy Cows, Prevalence, Repeat Breeder, Risk Factor

Received : 03-06-2024, Accepted : 18-07-2024, Published online : 17-09-2024
Available at https://e-journal.unair.ac.id/MKH/index

INTRODUCTION

The cattle farming sector in Indonesia is predominantly composed of smallholder farms, accounting for 97.7% of the total. The dairy cow population in 2023 reached 0.5 million, marking a 12.90% decrease from the previous year (Central Bureau of Statistics, 2023). Given these statistics, it is evident that some dairy cows may encounter reproductive disorders, which can significantly disrupt their reproductive systems and overall productivity leading to decrease their population. Reproductive performances are often evaluated through variables such as service per conception (S/C), calving interval (CI), days open (DO), conception rate (CR), and calving rate (CvR) (Ananda et al., 2019). The occurrence of this disease can be detrimental to farmers because the reproduction and productivity of cattle become inefficient (Prihatno et al., 2012).

The prevalence of repeat breeders ranges from 5% to 30% and tends to be higher in tropical regions (Yusuf et al., 2012). In Indonesia, the incidence of repeat breeders is observed across various provinces. Research conducted following the method by Munawaroh et al. (2020) focused on data from dairy cows that had undergone four mating attempts without successful pregnancy, with a sample size of 50 cows selected from the Batu City. Previous study showed several factors contribute to the occurrence of repeat breeders, including inadequate record-keeping on farms (Mendefro and Negash, 2014), insufficient mineral supplementation in feed (Pérez-Marín and Quintela, 2023), endometeritis, low body condition scores (Jeong and Kim, 2022), and history of retained placenta (Hasib et al., 2020). Addressing these factors is crucial, particularly in Batu City, where repeat breeder incidence poses a significant challenge that warrants further investigation. Hence, there is a need for research to assess the prevalence and identify risk factors associated with repeat breeders, providing valuable insights for cattle breeders and policymakers in Batu City.

MATERIALS AND METHODS

This research is a non-experimental survey. The data to be used in this study are primary data and secondary data. The method used is a survey method with a purposive sampling data collection technique. This study used adult female cows with repeat breeder cases under the auspices of the KUD "Bebarengan Anggayuh Tentrem Urip" Batu City, East Java Province. This research was carried out at the KUD Bebarengan Anggayuh Tentrem Urip Batu City, East Java Province. The research was conducted in March 2022. This study used a sample of 281 female dairy cows owned by 50 farmers. The time to complete the questionnaire was limited to 30 days.

The data that have been collected were then coded on all points of the questionnaire data variables to facilitate analysis. Questionnaire result data from the calculation of repeat breeder prevalence and risk factors in dairy cattle at the farmer level were then processed in the IBM SPSS 27 data program. The results of the tabulation

Received : 03-06-2024, Accepted : 18-07-2024, Published online : 17-09-2024
Available at https://e-journal.unair.ac.id/MKH/index

of data on the number of occurrences and risk factors for repeat breeders, the causes of repeat breeders in dairy cattle were analyzed descriptively and tested by Chi-Square (X^2) to measure the relationship of these factors to the incidence of repeat breeders with a 95% confidence level. If the magnitude of the relationship was significant for the factor on the occurrence of repeat breeders, an odds ratio (OR) test was carried out to see the strength of the relationship at the 95% confidence level. Prevalence is expressed as a percentage (%) which is calculated using the following formula (Hastutiek et al., 2019):

$$Prevalence = \frac{Positive\ result}{Number\ of\ sample} \times 100\%$$

RESULTS AND DISCUSSION

The analysis revealed that 30 out of 50 farmers, with a total of 58 out of 281 female dairy cows, experienced repeat breeder incidents. The results of the analysis of repeat breeder risk factors in dairy cattle at the breeder level are presented in a bivariate manner. The Chi-Square test uses a 2x2 table to find out whether there is a relationship between variables, while the odds ratio is to find out how big the strength of the relationship or probability occurs between repeat breeder variables and risk factors. OR cannot be carried out because it does not meet the requirements (Ghozali, 2018). The p-value that is significant at the 5% level is less than 0.05, and the p-value that is not significant at the 5% level is more than 0.05. Analysis of the relationship between several significant risk factors based on the Chi-Square test with the incidence of repeat breeders can be seen in Figure 1.

Variable	Information	Repeat breeder events		Chi Square (X^2)
		Positive	Negative	
Farmer characteristics				
Farming Experience	< 1 year (0%)	0	0	0,001[S]
	1-5 years (4%)	1	1	
	5-10 years (16%)	0	8	
	>10 yeras (80%)	29	11	
Knowledge of breeders about the occurrence of repeat breeders				
Cattle have experienced repeat breeders	Yes (60%)	30	0	0,000[S]
	No (30%)	0	20	
Knowing the treatment carried out by officers for repeat breeder events	Yes (30%)	3	12	0,000[S]
	No (70%)	27	8	
Knowing the characteristics of dairy cows that experience repeat breeders	Yes (98%)	29	20	0,000[S]
	No (2%)	1	0	
Routinely report to officers if cattle experience repeat breeders	Yes (60%)	30	0	0,000[S]
	No (40%)	0	20	
Knowledge of breeders about livestock reproduction and lust				
Farmers follow reproductive guidance on dairy cattle	Yes (78%)	20	19	0,018[S]
	No (22%)	10	1	
Farmers observe cows in heat in a day	1-2 time (72%)	16	20	0,000[S]
	3-4 time (28%)	14	0	
Reporting to officers and IB				
Breeders report to officers when cows experience repeat breeders	Yes (60%)	30	0	0,000[S]
	No (40%)	0	20	
The time required from reporting until the cows are mated	1-3 hours (16%)	8	0	0,026[S]
	4-6 hours (82%)	21	20	
	7-9 hours (2%)	1	0	
Cage				
The cleanliness of the cage environment is good	Yes (86%)	23	20	0,020[S]
	No (14%)	7	0	
How many times to clean the cage	1 time a day (0%)	0	0	0,011[S]
	2 times a day (48%)	10	14	
	3 times a day (52%)	20	6	
		0	0	
		0	0	
	3 times a day (0%) 1 times a week (0%)			
Dairy cows are often bathed	Yes (88%)	24	20	0,033[S]
	No (12%)	6	0	
How many times is a dairy cow bathed	1 time a day (58%)			0,000[S]
	2 times a day (34%)	23	6	
	3 times a day (4%)	3	14	
	3 times a day (0%)	0	0	
	1 times a week (4%)	2	0	
		2	0	
The drain of the cage empties into	River (24%)	12	0	0,011[S]
	Moor (4%)	2	0	
	Curai (2%)	1	0	
	Bulk (10%)	5	0	
	Vat (32%)	6	10	
	Yard (28%)	4	10	
Livestock Feed and Drink				
Additional feed other than forage and concentrate	Yes (42%)	5	16	0,000[S]
	No (58%)	25	4	
The feed used is other than forage and concentrate	There isn't any (58%)	25	4	0,000[S]
	Silage (8%)	4	0	
	Mineral (34%)	1	16	

Figure 1. Analysis of the Relationship between Risk Factors and Repeat Breeder Incidence in Dairy Cows. The superscript ([S]) shows significant differences between variables ($p \leq 0.05$).

Received : 03-06-2024, Accepted : 18-07-2024, Published online : 17-09-2024
Available at https://e-journal.unair.ac.id/MKH/index

Figure 1 shows the frequency of repeat breeder events in dairy cattle associated with several variables and obtained significant results. On the farmer's characteristic factor, the variable of farming experience is obtained. There were 29 respondents with more than 10 years of farming experience, eight respondents with 5-10 years of farming experience, one respondent with 1-5 years of farming experience, and no respondents with less than one year of farming experience as experienced repeat breeders. The *p*-value obtained is less than 0.05, so there is a significant relationship between the farmer's breeding experience and the incidence of repeat breeders in dairy cattle.

The study involved 281 dairy cows exhibiting normal estrus cycles and owned by 50 farmers. Analysis revealed that 30 farmers, with a total of 58 female dairy cows, experienced repeat breeder incidents. The prevalence of repeat breeders in KUD Bebarengan Anggayuh Tentrem Urip, Batu City, East Java, stood at 20.64%. This prevalence closely aligns with a similar study on dairy cattle in the Special Region of Yogyakarta conducted by Prihatno et al. (2013), which reported a prevalence of 29.4%. The incidence of repeat breeders varies across regions due to observed risk factors.

For the majority of cattle breeders in KUD Bebarengan Anggayuh Tentrem Urip, Batu City, East Java Province, the education background is elementary school (60%) and over 10 years of cattle-raising experience (80%). Advanced age and limited education levels may influence farmers' abilities and perspectives, consistent with the findings of Lestariningsih (2008). Farmers with higher education levels tend to be more receptive to new technologies and innovations, potentially leading to better progress. Experience in livestock breeding, defined as the duration of engagement in the livestock business, plays a significant role in determining a farmer's proficiency (Baffoe-Asare et al., 2013). In this study, all farmers had over a decade of experience in raising dairy cows, enabling them to address management challenges effectively.

The knowledge of clinical sign estrus and estrous cycles in cows significantly impacts reproductive management success. Farmers well-versed in these cycles can predict estrus occurrences accurately, facilitating precise mating timing. This is following the opinion of Van Eerdenburg et al. (2002) who reported that the main requirement in the management of dairy farms is knowledge of estrus and estrus cycles. However, ignorance about estrus cycles can elevate infertility and pregnancy failure rates, leading to repeat breeder incidents, as reported by Arero (2022).

The majority (98%) of farmers demonstrated good knowledge of repeat breeder cases, with 60% having firsthand experience. Despite engaging in off-farm work, most farmers diligently reported hot dairy cow symptoms to officers daily. However, the lack of awareness among family members not directly involved in cattle raising about estrus signs and cycles contributes to delayed reporting of estrus occurrences. Errors in detecting estrus will result in inappropriate timing of artificial insemination (AI) which will result in low pregnancy rates (Marques et al., 2020).

Farmer experience, education, and knowledge of estrus cycles significantly

Received : 03-06-2024, Accepted : 18-07-2024, Published online : 17-09-2024
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influence the incidence of repeat breeders in cattle herds. Experienced farmers often have a keen eye for detecting subtle signs of estrus and are better at timing insemination. Their accumulated knowledge also aids in early identification of health issues that may affect fertility (Maulana et al., 2022). Farmer education enhances understanding of reproductive physiology and promotes the implementation of evidence-based practices. Educated farmers are more likely to utilize modern breeding technologies effectively and maintain better records (Jonker, 2022). Knowledge of estrus cycles is crucial for accurate heat detection, optimal insemination timing, and recognition of abnormal cycles that may indicate underlying problems (Roelofs et al., 2010). When these three factors are combined, they can have a synergistic effect, potentially decreasing the incidence of repeat breeders.

Cows require proper housing to shield them from adverse environmental conditions, ensuring their comfort and well-being (Anaebo et al., 2023). The housing system is critical in dairy farming, serving not only as shelter but also as protection against various disturbances (Herbut et al., 2018), including exposure to harsh weather elements, wildlife, and theft (Von Keyserlingk et al., 2009). Maintaining cleanliness within the enclosure is vital, involving regular cleaning of feeding and watering areas, as well as removing feces and leftover feed from the floor. The study's findings indicate that most farmers maintain good environmental hygiene in their enclosures to prevent illness and contamination of milk with feces, aligning with Madec's (2013) emphasis on maintaining a clean cowshed environment to safeguard cow health during milking.

However, the majority of cowsheds in KUD Bebarengan Anggayuh Tentrem Urip, Batu City, East Java, fail to meet the standards set by the Directorate of Livestock Breeding (2014). Many lack manure storage facilities, leftover feed storage areas, and proper drainage, and some even accommodate other animals alongside dairy cows. Cages must have designated areas for storing manure, designed to facilitate drying and decomposition into compost. Daily removal of manure, either feces or urine, through drainage channels to lower shelters is necessary. In some cases, farmers near rivers dispose of cow dung directly into the water without processing it into fertilizer, while others pile feces behind the pen, occasionally collecting it for composting or burning leftover feed near the dairy cows.

Feed plays a role in livestock farming, significantly impacting the reproductive performance (Ratnani et al., 2020). Inadequate feeding can lead to non-infectious reproductive disorders in livestock, with the addition of concentrates rich in protein, carbohydrates, and minerals accelerating sexual maturity and pregnancy compared to those without such supplementation (Supriyantono *et al*., 2020). Phosphorus and protein deficiencies can delay puberty and cause abnormal estrus signs (Yendraliza, 2013). Moreover, energy from the feed is essential for producing the follicle stimulating hormone (FSH) and luteinizing hormone (LH), which stimulates follicle growth and ovarian function, crucial for postpartum estrus (Kawashima et al., 2012).

Received : 03-06-2024, Accepted : 18-07-2024, Published online : 17-09-2024
Available at https://e-journal.unair.ac.id/MKH/index

Research data indicate that dairy farmers routinely provide feed to their cows, primarily consisting of forage such as elephant grass, ordinary grass, and lamtoro leaves, supplemented with concentrates. The quality and quantity of livestock feed rations significantly influence the success of a dairy farm, impacting the animals' overall health and reproductive health (Ibtisham et al., 2018). This is in accordance with Laryska and Nurhajati (2013), where feed provided to livestock typically consists of forages and concentrates. Forages may include rice straw, sugarcane leaf shoots, lamtoro, elephant, bengal, and king grass.

Cows generally receive forage equivalent to 10% of their body weight, supplemented with an additional 1-2% of body weight in feed. Lactating cows require a higher proportion of feed, with 25% of their rations composed of forage and concentrate. It's recommended to supplement fresh grass forage with legumes. Concentrates serve to fulfill protein, carbohydrate, fat, and mineral requirements that may not be adequately met by forage alone (Supriyanto et al., 2020).

The quality and quantity of feed provided to dairy cows play a crucial role in their reproductive health and overall fertility. A well-balanced, nutrient-rich diet directly impacts hormonal balance, ovarian function, and embryo development (Izquierdo et al., 2021). Adequate energy intake is essential for maintaining body condition score, which significantly affects fertility; cows with optimal body condition are more likely to show clear signs of estrus and conceive successfully (Nazhat et al., 2021). Protein levels in the feed must be carefully managed, as both deficiency and excess can negatively impact fertility (Sammad et al., 2022). Micronutrients such as vitamins A, D, and E, as well as minerals like selenium, copper, and zinc, are vital for reproductive processes and immune function (Ion et al., 2022).

Proper fiber content in the diet supports rumen health, which indirectly affects fertility by ensuring efficient nutrient absorption and metabolism (Zebeli et al., 2015). Conversely, poor quality feed or inadequate quantities can lead to nutritional imbalances, metabolic disorders, and weakened immune systems, all of which can contribute to reduced fertility and increased incidence of repeat breeding (Rajendran et al., 2022). Providing a balanced and nutrient-rich feed tailored to the specific needs of dairy cows at different stages of lactation and reproduction can significantly improve fertility rates. This approach can enhance ovarian activity, increase conception rates, reduce early embryonic losses, and lower the incidence of postpartum disorders that affect subsequent fertility (Ding et al., 2024).

Water, another critical aspect, is provided ad libitum to dairy cows, with clean and uncontaminated sources readily accessible (Haryanto *et* al., 2015). Drinking water is essential for maintaining fluid balance, ion balance, digestion, nutrient metabolism, waste excretion, fetal environment, and nutrient transport to body tissues (Prihatno et al., 2013). Disturbances in water homeostasis can adversely affect reproductive cell function, leading to decreased fertility (Zhang et al., 2012). Thus, ensuring proper access to clean water is essential for maintaining livestock

Received : 03-06-2024, Accepted : 18-07-2024, Published online : 17-09-2024
Available at https://e-journal.unair.ac.id/MKH/index

fertility and overall health (Haryanto et al., 2015).

Based on the findings of this study, several practical recommendations can be made to improve dairy farming management and reduce the incidence of repeat breeders. Firstly, implementing comprehensive farmer training programs is crucial. These programs should focus on enhancing farmers' understanding of reproductive physiology, estrus detection techniques, and optimal breeding practices. Regular workshops and seminars can keep farmers updated on the latest research and technologies in dairy reproduction. Secondly, improving housing conditions is essential for reducing stress and promoting overall cattle health. This might involve investing in better ventilation systems, providing comfortable bedding, and ensuring adequate space per animal.

Thirdly, enhancing feed quality is vital for supporting reproductive health. Farmers should work with nutritionists to develop balanced rations that meet the specific needs of their herd, paying special attention to minerals and vitamins crucial for fertility. Lastly, increasing knowledge of estrus cycles among farmers and farm workers is critical. This can be achieved through targeted education on the physiological signs of estrus, the use of heat detection aids, and the implementation of accurate record-keeping systems. Farmers should also be encouraged to use technologies such as activity monitors or hormone testing to improve the accuracy of estrus detection.

By implementing these recommendations, dairy farms can potentially see a significant reduction in repeat breeder incidence, with improvements in overall reproductive efficiency depending on the extent of implementation and farm-specific factors. However, it's important to note that these changes may require initial investments in time and resources, but the long-term benefits in improved herd productivity and profitability can be substantial.

CONCLUSION

The prevalence of repeat breeders in dairy cows at the KUD Bebarengan Anggayuh Tentrem Urip, Batu City, East Java Province is 20.64%. The risk factors that influence the occurrence of repeat breeders are farming experience, knowledge of breeders about repeat breeders, knowledge of livestock reproduction and lust, reporting to officers and AI, housing, and animal feed and drink. Variables supporting risk factors include farming experience, cows that have experienced repeat breeders, knowing the treatment given by officers.

ETHICS APPROVAL

Ethical clearance is not required for this study because it is a survey study using a questionnaire method. The questionnaire is aimed to the farmers in the KUD "Bebarengan Anggayuh Tentrem Urip" Batu City, East Java.

ACKNOWLEDGMENT

The author would like to express gratitude to all the faculty members of the Faculty of Veterinary Medicine at Airlangga University for their advice, input, and

Received : 03-06-2024, Accepted : 18-07-2024, Published online : 17-09-2024
Available at https://e-journal.unair.ac.id/MKH/index

motivation and to all the staff and farmers of KUD Bebarengan Anggayuh Tentrem Urip, Batu City, East Java Province, for their valuable support and contributions to this research.

REFERENCES

Anaebo, C. M., P. Egbum, J. Barnaby, U. Igwegbe, and I. M. Onuorah. 2023. Using Architectural Strategies in Conservation of Igbo Cattle (Ehi Igbo): A Case Study of Igbariam, Awka North Lga, Anambra State. *African Journal of Educational Management, Teaching and Entrepreneurship Studies*, 9(1): 218-227.

Ananda, H. M., W. Wurlina, N. Hidajati, M. Hariadi, A. Samik, and T. J. Restiadi. 2020. Hubungan Antara Umur dengan Calving Interval, days open, and service per conception sapi Friesian Holstein (FH). *Ovozoa: Journal of Animal Reproduction*, 8(2): 94–99. https://doi.org/10.20473/ovz.v8i2.2019.94-99

Arero, G. B. 2022. Major Reproductive Health Disorders in Dairy Cows. *Journal of Animal Biology and Veterinary Medicine*, 2: 1-11. https://doi.org/10.17303/javm.2022.1.104

Baffoe-Asare, R., J. A. Danquah, and F. Annor-Frempong. 2013. Socioeconomic factors influencing adoption of CODAPEC and cocoa high-tech technologies among small holder farmers in Central Region of Ghana. *American Journal of experimental agriculture*, 3(2): 277-292. http://dx.doi.org/10.9734/AJEA/2013/1969

Central Bureau of Statistics. 2023. *Statistik Peternakan Dan Kesehatan Hewan*. Badan Pusat Statistik. Jakarta.

Ding, Y., X. Liu, Y. Guan, Z. Li, M. Luo, D. Wu, L. Ye, L. Guo, L. Wang, and Y. Guan. 2024. Balancing nutrition for successful reproduction in ruminants. *Modern Agriculture*, 2(1): e29. https://doi.org/10.1002/moda.29

Directorate of Livestock Breeding. 2014. *LAKIP Perbibitan Ternak Tahun 2014*. SAKIP Kementerian Pertanian. Jakarta.

Ghozali, I. 2018. *Aplikasi Analisis Multivariete SPSS 25*, 9th Ed. Universitas Diponegoro. Semarang.

Haryanto, D., M. Hartono, and S. Suharyati. 2015. Beberapa faktor yang memengaruhi service per conception pada Sapi Bali di Kabupaten Pringsewu. *Jurnal Ilmiah Peternakan Terpadu*, 3(3): 151-156. https://dx.doi.org/10.23960/jipt.v3i3.840

Hasib, F. M. Y., M. M. B. Reza, M. M. U. Alam, and T. H. Azizunnesa. 2020. Occurrence and risk factors of repeat breeding on household dairy cows of Hathazari in Chattogram. *Bangladesh Journal of Veterinary and Animal Sciences*, 8(1): 102-111. http://dx.doi.org/10.60015/bjvas/V08I1A12

Hastutiek, P., W. M. Yuniarti, M. Djaeri, N. D. R. Lastuti, E. Suprihati, and L. T. Suwanti. 2019. Prevalence and diversity of gastrointestinal protozoa in Madura cattle at Bangkalan Regency, East Java, Indonesia. *Veterinary World*, 12(2): 198. https://doi.org/10.14202%2Fvetworld.2019.198-204

Received : 03-06-2024, Accepted : 18-07-2024, Published online : 17-09-2024
Available at https://e-journal.unair.ac.id/MKH/index

Herbut, P., S. Angrecka, and J. Walczak. 2018. Environmental parameters to assessing of heat stress in dairy cattle—a review. *International journal of biometeorology*, 62: 2089-2097. https://doi.org/10.1007/s00484-018-1629-9

Ibtisham, F., A. Nawab, G. Li, M. Xiao, L. An, and G. Naseer. 2018. Effect of nutrition on reproductive efficiency of dairy animals. *Medycyna Weterynaryjna*, 74(06). https://doi.org/10.21521/mw.6025

Ion, C., P. Nicolae, S. Lavinia, P. Ioan, M. Adela, S. Ducu, D. Dorel, and J. Călin. 2022. The Effect of Nutrients on the Reproductive Performance of Dairy Cows. *Scientific Papers: Animal Science & Biotechnologies/Lucrari Stiintifice: Zootehnie si Biotehnologii*. 55(2).

Izquierdo, A. C., A. E. I. Reyes, G. R. Lang, J. S. Oaxaca, J. E. G. Liera, E. A. V. Mancera, M. d. L. J. Mosqueda, A. G. Vazques, P. S. Aparicio, C. J. B. Cedeno, J. O. Perez, and R. S. Sánchez. 2021. Nutrition and Food in the Reproduction of Cattle. *European Journal of Agriculture and Food Sciences*, 3(3): 21-33. https://doi.org/10.24018/ejfood.2021.3.3.184

Jeong, J. K., and I. H. Kim. 2022. Risk factors for repeat breeder dairy cows and their impacts on reproductive performance. *Korean Journal of Veterinary Research*, 62(2). https://doi.org/10.14405/kjvr.20220003

Jonker, F. H. 2022. A personal view on basic education in reproduction: Where are we now and where are we going? *Reproduction in Domestic Animals*, 57: 7-15. https://doi.org/10.1111/rda.13769

Kawashima, C., M. Matsui, T. Shimizu, K. Kida, and A, Miyamoto. 2012. Nutritional factors that regulate ovulation of the dominant follicle during the first follicular wave postpartum in high-producing dairy cows. *Journal of Reproduction and Development*, 58(1): 10-16. https://doi.org/10.1262/jrd.11-139n

Laryska, N., and T. Nurhajati. 2013. Peningkatan kadar lemak susu sapi perah dengan pemberian pakan konsentrat komersial dibandingkan dengan ampas tahu. *Agroveteriner*, 1(2): 79-87.

Lestariningsih, M., Basuki., and Endang. 2008. Peran serta wanita peternak sapi perah dalam meningkatkan taraf hidup keluarga. *Jurnal Ekonomi dan Keuangan EKUITAS*, 12(1): 121-141. https://doi.org/10.24034/j25485024.y2008.v12.i1.236

Madec, F. 2013. Aiming at building cleanliness to keep livestock healthy. Livestock housing: Modern management to ensure optimal health and welfare of farm animals. 902-909. https://doi.org/10.3920/978-90-8686-771-4

Mandefro, M., and G. Negash. 2014. Repeat breeder syndrome in dairy cows: influence of breed and age on its prevalence. *World Journal of Agricultural Sciences*, 10(4): 200-203. https://doi.org/10.5829/idosi.wjas.2014.10.4.8651

Marques, O., A. Veronese, V. R. Merenda, R. S. Bisinotto, and R. C. Chebel. 2020. Effect of estrous detection strategy on

Received : 03-06-2024, Accepted : 18-07-2024, Published online : 17-09-2024
Available at https://e-journal.unair.ac.id/MKH/index

pregnancy outcomes of lactating Holstein cows receiving artificial insemination and embryo transfer. *Journal of Dairy Science*, 103(7): 6635-6646. https://doi.org/10.3168/jds.2019-17892

Maulana, R., H. Susetya, and S. A. Prihatno. 2022. Prevalence and risk factors associated with repeat breeding of beef cattle in Sleman Regency, Indonesia. *Veterinary World*, 15(4): 870. https://doi.org/10.14202%2Fvetworld.2022.870-877

Munawaroh, L., N. Humaidah, and D. Suryanto. 2020. Studi kasus kawin berulang pada sapi perah Peranakan Frisian Holland di wilayah kerja petugas kesehatan hewan Batu. *Dinamika Rekasatwa: Jurnal Ilmiah (e-Journal)*, 3(02).

Nazhat, S. A., A. Aziz, J. Zabuli, and S. Rahmati. 2021. Importance of body condition scoring in reproductive performance of dairy cows: a review. *Open Journal of Veterinary* Medicine, 11(7): 272-288. https://doi.org/10.4236/ojvm.2021.117018

Pérez-Marín, C. C., and L. A. Quintela. 2023. Current insights in the repeat breeder cow syndrome. *Animals*, 13(13), 2187. https://doi.org/10.3390/ani13132187

Prihatno, S., A. Kusumawati., N. Karja and B. Sumiarto. 2013. Prevalensi dan Faktor Resiko Kawin Berulang pada Sapi Perah pada Tingkat Peternak. *Jurnal Veteriner*, 14(4): 452-461.

Rajendran, D., N. K. S. Gowda, S. B. N. Rao, P. E. Babu, A. Manimaran, and A. Kumaresan. 2022. Nutritional strategies to improve reproductive efficiency in cattle and buffaloes. In A. Kumaresan and A. K. Srivastava (Eds.), *Current Concepts in Bovine Reproduction* (pp. 47-67). Singapore: Springer Nature Singapore. https://doi.org/10.1007/978-981-19-0116-4_4

Ratnani, H., D. K. Meles, and I. Mustofa. 2020. Penanganan Gangguan Reproduksi untuk Meningkatkan Efisiensi Reproduksi pada Sapi Perah menuju Swasembada Susu di Kecamatan Sendang Kabupaten Tulungagung. *Jurnal Layanan Masyarakat*, 4(1), 43-52. http://dx.doi.org/10.20473/jlm.v4i1.2020.43-52

Roelofs, J., F. Lopez-Gatius, R. H. F. Hunter, F. J. C. M. Van Eerdenburg, and C. H. Hanzen. 2010. When is a cow in estrus? Clinical and practical aspects. *Theriogenology*, 74(3), 327-344. https://doi.org/10.1016/j.theriogenology.2010.02.016

Sammad, A., M. Z. Khan, Z. Abbas, L. Hu, Q. Ullah, Y. Wang, H. Zhu, and Y. Wang. 2022. Major nutritional metabolic alterations influencing the reproductive system of postpartum dairy cows. *Metabolites*, 12(1), 60. https://doi.org/10.3390/metabo12010060

Supriyantono, A., D. A. Iyai, and A. R. Ollong. 2020. Peningkatan Produktivitas Sapi Potong Melalui Introduksi Pakan Konsentrat dengan Bahan LokalpPada Masyarakat Asli Papua: Productivity Improvement of Beef Cattle through the Introduction of Feed Concentrates to the Local Papuan.

Received : 03-06-2024, Accepted : 18-07-2024, Published online : 17-09-2024
Available at https://e-journal.unair.ac.id/MKH/index

IGKOJEI: Jurnal Pengabdian Masyarakat, 1(1), 21-29. http://dx.doi.org/10.46549/igkojei.v1i1.126

Von Keyserlingk, M. A. G., J. Rushen, A. M. de Passillé, and D. M. Weary. 2009. Invited review: The welfare of dairy cattle—Key concepts and the role of science. *Journal of dairy science*, 92(9), 4101-4111. https://doi.org/10.3168/jds.2009-2326

Yusuf, M., L. Rahim, M. A. Asja, and A. Wahyudi. 2012. The incidence of repeat breeding in dairy cows under tropical condition. *Media Peternakan*, 35(1), 28-28. https://dx.doi.org/10.5398/medpet.2012.35.1.28

Zebeli, Q., K. Ghareeb, E. Humer, B. U. Metzler-Zebeli, and U. Besenfelder. 2015. Nutrition, rumen health and inflammation in the transition period and their role on overall health and fertility in dairy cows. *Research in Veterinary Science*, 103, 126-136. https://doi.org/10.1016/j.rvsc.2015.09.020

Zhang, D., Y.J. Tan., F. Qu., J.Z. Sheng, and H.F. Huang. 2012. Functions of water channels in male and female reproductive systems. *Molecular Aspects of Medicine*, 33(5-6): 676-690. https://doi.org/10.1016/j.mam.2012.02.002

Received : 03-06-2024, Accepted : 18-07-2024, Published online : 17-09-2024
Available at https://e-journal.unair.ac.id/MKH/index