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ADVANCES IN SOCIAL HUMANITIES RESEARCH

FARMERS' ABILITY IN ESTRUS DETECTION AND MATING TIME DETERMINATION FOR MOA BUFFALO COWS IN MOA DISTRICT, SOUTHWEST MALUKU REGENCY

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Abstract

The purpose of this study was to determine the ability of breeders in the detection of heat and determination of mating time in Moa buffalo mothers in Moa District, Southwest Maluku Regency. This research is planned to take place for 1 month from September to October 2024 in Moa District, Southwest Maluku Regency. Determination of sample villages by purposive sampling by considering the density of buffalo population and in accordance with the geographical villages/hamlets on Moa island, namely the western region (Pati and Werwaru villages), the central region (Klis and Nyama villages), and the eastern region (tounwawan and Poliwu). The number of respondents interviewed was 60 people. Data collection was carried out by interview. Respondents were selected through purposive sampling with the criteria of having at least 3 female buffaloes and at least 1 male and having been in the business for more than 5 years. Observational variables included: breeder's ability to detect lambing, post partum mating timing, and mother productivity including: age at first mating, pregnancy rate, birth rate, post partum mating and preweaning mortality. The data obtained were tabulated, analyzed using descriptive statistical analysis by calculating the percentage, average and standard deviation. The results showed that 58.33% of farmer respondents in Moa Sub-district, Southwest Maluku Regency had knowledge and ability in the moderate category in detecting lambing, 40.00% of farmers had knowledge and ability in the low category, and 1.67% of farmers had knowledge and ability in the good category. 100% of farmer respondents in Moa Sub-district, West Maluku District did not have the knowledge and ability to determine the right mating time after parturition. The potential productivity of Moa buffalo mothers is as follows: age at first mating 37.17 ± 2.42 months, pregnancy rate 77.20%, birth rate 97.66%, post partum mating 12.47 ± 0.85, and preweaning mortality 19.76%.

Keywords: Moa Buffalo, Breeding Detection, Mating Time, Productivity

Introduction

Moa buffalo is one of the local beef cattle germplasm that is resistant to dry agroecosystem environments and thrives on Moa island (Pipiana *et al*., 2010). Socio-culturally, buffalo farming is closely related to local customs where buffalo can be used as a means of paying customary sanctions, dowries, and can also be used as a medium of

exchange in certain transactions such as buying and selling land and motorized vehicles (Tatipikalawan and Sangadji, 2024).

Buffalo is one of the ruminants that has high economic value. The high selling price of buffaloes has made the buffalo business a source of income for the farming community in Moa Sub-district, Southwest Maluku District. Since 2005, collecting traders from Jeneponto District have started to come and buy buffaloes on Moa island and the market destination in Sulawesi is for traditional ceremonies in Toraja (Tetrapoik *et al*., 2024). Excessive sales of Moa buffalo outside of Moa island will threaten the population status of Moa buffalo on Moa island. Dolhalewan *et al*. (2013) suggested that the population status of Moa buffalo may be threatened if it is used as a sustainable commercial source, unless its exploitation is regulated.

Conservation of Moa buffalo can be done by considering science in the field of reproduction to maintain a balance between livestock that will be sold and livestock that must be maintained and the reproduction process is carried out to obtain new generations or offspring. One of the important reproductive knowledge to know is the detection of estrus and the determination of mating time in Moa buffalo mothers.

Estrus is one of the important factors in reproductive management. Failure in estrus detection can lead to pregnancy failure. Proper detection of estrus is an important factor in the mating program so that fertilization can be carried out at the right time (Jurame *et al*., 2018). Estrus detection can generally be done by: 1) seeing red swelling of the vulva; 2) clear mucus discharge from the vulva; 3) decreased appetite; 4) desire to interact with other cattle; 5) standing still when ridden by males or other females; 6) increased urination frequency (Toelihere, 1993). The heat cycle lasts 19-25 with an average of 20.8 days in buffaloes in Indonesia (Toelihere, 1976). Observation of heat in cattle should be done twice, in the morning and evening so that heat can be observed and not missed (Salisbury and Vandenmark, 1978). Mongkopunya (1980) states that the length of heat of swamp buffaloes is 32 hours, as well as the opinion of Guzman (1980) which states that the length of heat of swamp buffaloes ranges from 1-36 hours or an average of 32 hours.

Based on the description above, there is a need for a study related to "The Ability of Breeders to Detect Oestrus and Determine Mating Time in Moa Buffalo Sows".

Research Methods

Time and Place of Research

This research lasted for 1 month from September to October 2024 in Moa District, Southwest Maluku Regency.

Research Materials and Methods

The materials used in this study were Moa buffaloes and buffalo farmers on Moa island as primary data sources. Secondary data was obtained from the Agriculture and Livestock Service Office of Southwest Maluku Regency. The number of respondents interviewed was 60 farmers according to the selected location.

Determination of sample villages by purposive sampling by considering the density of buffalo population and in accordance with the geographical villages/hamlets on Moa island, namely the West Region (Pati and Werwaru Villages), Central Region (Klis Village and Nyama Preparatory Village), and East Region (Tounwawan Village and Poliwu Preparatory Village). Data collection was carried out by direct interview to 60 respondents by referring to the questionnaire that had been prepared. Respondents were selected using purposive sampling with the criteria of having at least 3 female buffaloes and at least 1 male and having been in the business for more than 5 years

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Observation Variables

1) Farmer's knowledge in detecting lameness with characteristics:
    1. **Behavioral changes**:
        - Buffaloes tend to be more agitated, active and often seek attention from males.
        - Ears of female buffaloes in estrus usually move more frequently and may appear more erect,
        - Some buffaloes may show a decrease in appetite or a change in diet while in estrus
    2. **Swelling of the vulva**: The vulva will appear more swollen and reddish in color.
    3. **Mucous discharge:** There may be mucous discharge from the vulva, which can be seen as spotting on the surrounding area.
    4. **Bull signals**: Bulls may be more interested and active in approaching a female buffalo in estrus.
    5. **Male Reception**: One of the most obvious signs is acceptance of the male. Female buffaloes in estrus will be willing to be mated and may show signs of lordosis, a body position that facilitates mating, often with the tail raised

The breeder's ability category is divided into a) good category (if able to name 4 or more characteristics), b) medium category (if able to name 2-3 characteristics), and poor category (if only able to name 1 characteristic).

2) Determination of mating time after parturition, categorized into:
    1. **Known criteria** (if the buffalo is mated according to the correct mating time, namely if the buffalo is in heat at a certain time and can only be mated within 12-18 hours after heat appear.
    2. **Not knowing criteria (**if buffaloes mate without farmer control or natural mating).
3) Broodstock productivity includes: age at first mating, pregnancy rate, birth rate, postpartum mating, and preweaning mortality rate.

Data Analysis

The data obtained were tabulated, analyzed using descriptive statistical analysis by calculating the percentage, mean and standard deviation of each variable according to the research objectives and descriptive discussion of the research results

Results and Discussion

Social Characteristics of Farmers

Age

The results showed that the largest percentage of buffalo farmer respondents in Moa Subdistrict, Southwest Maluku Regency, were in the age range of 25-64 years old at 93.33%, while 6.67% were in the >64 years old category (Table 1).

Table 1. Age of Buffalo Farmer Respondents in Moa Sub-district

Age Category	Total (n)	Percentage (%)
25-64 Year	56	93,33
>64 Year	4	6,67
Total	60	100,00

Source: Processed Data (2024)

Based on the table above, it can be seen that most of the respondents are in the productive age range and are the ideal age for workers because Moa buffaloes are large ruminants that require strong physique and energy to maintain. Farmers in this age range will be more rational in making decisions. This is in line with the opinion of Ervina et al. (2019) that the higher the age of a person, the higher the tendency for maturity in thinking and acting more wisely. Makatita (2014) adds that a person's age affects work productivity in types of work that rely on physical and labor. The age range between 15-64 years is the productive age range (Putri and Setiawina, 2013).

Education

The largest percentage of formal education of farmers in Moa Sub-district is elementary school graduates at 65.00%, followed by junior high school graduates at 18.33%, senior high school graduates at 13.33%, and diploma (D3) 1.67%. The results also showed that farmer respondents who participated in non-formal education in the form of counseling were only 10 respondents (16.67%) while 50 respondents (83.33%) never participated in counseling activities. Formal and Non-Formal Education of Buffalo Farmer Respondents in Moa Sub-district is shown in Table 2 below.

Table 2. Formal and Non-Formal Education of Buffalo Farmer Respondents in Moa Sub-district

Description	Total (n)	Percentage (%)
Total of Respondents	60	
Formal Education		

Graduated from elementary school	39	65,00
Junior high school graduate	11	18,33
High school graduate	8	13,33
Diploma (D3)	1	1,67
Non-Formal Education		
Counseling	10	16,67
Never attended	50	83,33

Source: Processed Data (2024)

Education is closely related to the ability of buffalo farmers to run and manage their business activities. The level of education affects a person's mindset and performance so that education affects the process of receiving information and new technology provided to buffalo farmers as an effort to increase income. Based on the research data, the education level of buffalo farmers can be said to be low because 83.33% of farmers have elementary and junior high school education levels. The low level of education of these farmers will cause farmers to be less wise in making decisions and become a factor inhibiting the smooth running of activities in adopting knowledge and skills in the field of livestock business. This is in line with the opinion of Paltasingh and Goyari (2018) that increasing farmer knowledge can increase technology adoption and ultimately increase agricultural productivity. Gusti et al. (2021) also suggested that farmers with higher education levels generally have a more open mindset in accepting new innovations and understand more quickly in applying new technologies so that they can develop and bring agricultural yields to a better direction.

Occupation

The results showed that the main occupation as a farmer was 80%, breeder was 13.33%, civil servant was 1.67%, village official was 1.67%, self-employed was 1.67% and honorary employee was 1.67% (Table 3).

Table 3. Respondent's Work of Buffalo Farmers in Moa District

Description	Total (n)	Percentage (%)
Total of Respondents	60	
Main Occupation		
Breeder	8	13,33
Farmer	48	80,00
Civil servants	1	1,67
Village Apparatus	1	1,67
Self employed	1	1,67
Honorary Employees	1	1,67
Side hustle		
Breeder	52	86,67
Farmer	8	13,33

Source: Processed Data (2024).

The results of the study showed that most of the respondents stated that the buffalo farming business that was temporarily run was a side business, and also most of the respondents stated that the main occupation of the respondents was farmers. This is evident from the activities of more respondents to go to Lutur to grow crops. Crops that are commonly grown include corn, cassava, petatas, bananas, peanuts, kidney beans and vegetables. Meanwhile, the time needed to herd buffalo livestock is 2-4 hours.

Experience and Length of Business in Raising Buffalo Cattle

The results showed that the percentage of experience in raising buffalo cattle in 5-10 years of business experience was 8.33%, in 11-15 years of business experience was 13.33%, in 16-20 years of business experience was 20%, and in >20 years of business experience was 58.33%. Experience of Raising Buffalo Cattle in Moa District (Table 4).

Table 4. Experience of Raising Buffalo Cattle in Moa District

Length of Experience (years)	Number (n)	Percentage (%)
< 5	0	0,00
5-10	5	8,33
11-15	8	13,33
16-20	12	20,00
> 20	35	58,33
Sum	60	100,00

Source: Processed Data (2024)

The results of the study show that the percentage of years of business raising buffalo livestock at 5-10 years is 21.67%, at 11-15 years of business is 11.67%, at 16-20 years of business is 15%, and >20 years is 51.67%. The length of business to raise Buffalo Cattle in Moa District is shown in Table 5.

Table 5. How Long of Buffalo Farming in Moa District

Length of Experience (years)	Number (n)	Percentage (%)
< 5	0	0,00
5-10	13	21,67
11-15	7	11,67
16-20	9	15,00
> 20	31	51,67
Sum	60	100,00

Source: Processed Data (2024).

The length of business and experience of buffalo farming that is temporarily undertaken is mostly in the range of >20 years, which is 51.67% and 58.33%, then followed by the length of business and business experience in other ranges shown in Table 4 and Table 5.

The results of observations in the field show that the pattern of raising buffalo livestock is still traditional with no farmer who has applied technology in running his livestock business. This is because farmers are more likely to apply maintenance patterns that have been carried out for generations, in addition to the low access to information and non-formal education causes a low level of knowledge and skills of farmers. This condition will limit farmers in adopting technology. This is in line with the opinion of Ansah et al., (2015) that farmers who have a lot of experience generally do not want to adopt innovations and new technologies, compared to inexperienced farmers, because they are already at an old age and are generally poorly educated.

The length of business is the amount of time a person spends running his livestock business. The longer a farmer runs a business and is involved in the production process, the better and more skilled his work experience will be (Tatipikalawan *et al*, 2022). Most of the buffalo farmers in Moa District have a business period of more than 20 years. This proves that the farming community in Moa District is experienced in raising buffaloes. This is in line with the opinion of Nona and Juniasih, (2020), stating that a farmer is said to be experienced in his livestock business if he has been in the business field for 5-10 years and less experienced if he has been in the job for less than 5 years. However, the application of innovation and new technology has not been fully carried out by farmers in Moa District, so it is hoped that this experience and length of business will be a motivation for farmers in running their livestock business, both as the main and side livelihoods in improving the welfare of farmers and their families.

Buffalo Ownership

The ownership of buffalo livestock raised by respondents in Moa District, Southwest Maluku Regency can be seen in Table 6.

Table 6. Buffalo livestock ownership

Group Age	Village Name						Sum (tail)	Percentage (%)
	Klis	Nyama	Werwaru	Starch	Tounwawan	Poliwu		
Adult		1						
Male	41	19	35	3	49	29	176	13,34
Female	102	65	62	34	94	86	443	33,59
Sum	143	84	97	37	143	115	619	46,93
Dove								
Male	35	17	32	4	35	24	147	11,14
Female	51	19	53	4	55	41	223	16,91
Sum	86	36	85	8	90	65	370	28,05
Child								

Male	33	23	22	6	34	17	135	10,24
Female	54	32	27	8	37	37	195	14,78
Sum	87	55	49	14	71	54	330	25,02
Total	316	175	231	59	304	234	1319	100

Source: Processed Data (2024).

Buffalo livestock ownership is the large number of livestock raised by respondents. Livestock ownership is differentiated by age and gender, age groups are divided into; a) children ≤ 2 years old, b) young people aged 2-3 years, c) adults ≥ 3 years old (Wahyuni and Souhoka, 2022).

The total number of buffalo cattle in Moa District in six villages is 1319 heads, of which 135 male buffalo cattle in the child group are 135 (10.24%) and 195 female buffaloes (14.78%). In the virgin group, there were 147 male buffaloes (11.14%) and 223 females (16.91%). In the adult group, there were 176 male buffaloes (13.34) and 443 females (33.59%).

Sexual Detection Ability

The ability to detect bisexual in buffalo is very important for reproductive success in livestock cultivation, especially in managing the right mating time. Detection of birahi in buffalo can be done by observing changes in buffalo behavior, swelling of the vulva, discharge of the lender, signals from the male buffalo and **acceptance of the male.**

The breeder's ability category is divided into a) good category (if able to mention 4 or more characteristics), b) medium category (when able to mention 2-3 characteristics), and poor category (when only able to mention 1 characteristic). The ability of breeders in detecting sexual abuse can be seen in the following Table 7:

Table 7. Sexual Detection Ability

Capability Categories	Village Name						Respondents	Percentage
	Klis	Nyama	Werwaru	Starch	Tounwawan	Poliwu		
Good		1					1	1,67
Keep	6	6	6	3	9	5	35	58,33
Less	4	3	4	7	1	5	24	40,00
Total	10	10	10	10	10	10	60	100,00

Source: Processed Data (2024).

Based on Table 7, the ability to detect lust by Moa buffalo farmers in Moa District, Southwest Maluku Regency is mostly in the medium category, which is 58.33% who are able to answer 2-3 sexual characteristics and the poor category, which is 40.00% who are able to answer only 1 sexual characteristic, while in the good category, only 1.67% are able to answer 4-5 sexual characteristics. Most of the breeders' answers were to know the signs of sexual abuse such as vulvar swelling as many as 35 people and the characteristics of the mother accepting males as many as 48 people, while some other breeders only

knew about behavioral changes, mucus discharge, and signals from male buffaloes. Toelihere (1981) stated that the intensity of estrus in buffaloes and cows was assessed based on changes in the vulva, namely redness, swelling and heat, see-through mucus coming out of the vulva. Changes in behavior are snoring, restlessness and climbing fellow females (homosexual) and uterine tension. The observations of Arya & Madan (2001), Jainudeen (1986) and Toelihere (1981) showed that the symptoms of estrus were characterized by the discharge of clear mucus from the vulva. In the vulva is swollen, restless, climbing each other, looking for males, appetite decreases, raises the tail when the vulva is palpated, urinates frequently and always whines.

Birahi in Moa buffalo cattle in Moa District, Southwest Maluku Regency was only observed by chance by breeders and subsequently there was no further handling related to cattle mating. Generally, the Moa buffalo livestock maintenance system in Moa District, Southwest Maluku Regency is still extensive, so the detection of birahi is not carried out intensively. Buffalo cattle are raised, grazed on large grasslands and there are locations for wallowing places. Wallowing behavior in buffaloes is carried out every day. Mating between a mother buffalo and a male is not facilitated by the breeder. Based on the experience of breeders, mating in adult buffalo cattle will always occur on its own without the help of breeders. This is evidenced by the mother Moa buffalo who gets pregnant every year, but it is not known which male carries out the mating process on the mother buffalo. Yendraliza et al (2017) stated that the main obstacle that is felt to hinder the implementation of marriage in buffaloes is the difficulty of detecting estrus because the symptoms of estrus are generally unclear or silent heat. The difficulty of detecting estrus in buffaloes is due to the fact that farmers still carry out an extensive maintenance system and the habits of buffalo cattle that like to wallow in heat.

Mating Time Determination

Determining the right mating time is a knowledge and skill that every breeder must know. This is intended so that the female mother can be mated at the right time and has an effect on efforts to improve the reproductive efficiency of the buffalo livestock that are raised. Determination of mating time after partus, categorized on: tofu criteria (if buffalo livestock are mated according to the right mating time, namely if the buffalo is mated at a certain time and can only be mated at a vulnerable time 12-18 hours after the breed appears, while the criteria are unknown (if the buffalo livestock mates without the control of the breeder or natural mating). The determination of mating time in Moa buffalo cattle in Moa District is shown in Table 8.

Table 8. Mating Time Determination

Determination Category	Village Name						Respondents	Percentage
	Klis	Nyama	Werwaru	Starch	Tounwawan	Poliwu		
Know	0	0	0	0	0	0	0	0,00
Don't Know	10	10	10	10	10	10	60	100,00

Total	10	10	10	10	10	10	60	100,00

Source: Processed Data (2024).

The results of the study showed that as many as 100% of respondents who raised Moa buffalo in Moa District answered that they did not know the right time to mate after mating. This is because the mating pattern takes place naturally without any observation or control from the farmer respondents about the buffalo being raised, other than grazing. This condition is the result of an extensive traditional maintenance system and a lack of education levels, both formal and non-formal education, obtained by farmer respondents.

Parent Productivity

Maternal productivity includes: first mating age, pregnancy rate, birth rate, postpartum mating, and pre-weaning mortality rate. The productivity of Moa buffalo mothers raised by farmer respondents in Moa District, Southwest Maluku Regency is seen in Table 9 below

Table 9. Productivity of Buffalo Farmers

Parent Productivity	Average Elementary ±
First Marriage Age (months)	37.17 ± 2.42
Pregnancy Rate (%)	77,20
Birth Rate (%)	97,66
Post-Partus Marriage (month)	12.47 ± 0.85
Pre-Weaning Mortality (%)	19,76

Source: Processed Data (2024).

Age of First Marriage

The results of the study show that the average buffalo raised by farmers in Moa District is first mated at the age of 37,17 ± 2.42 (Table 9). This result is a bit slow when compared to the research of buffaloes on Buru Island by Wahyuni and Souhoka (2022) which stated that female buffaloes began to mate for the first time on average at the age of 32.45 ± 3.98 months. This is suspected to be due to the lack of attention from farmers due to the application of traditional maintenance patterns so that the maturation process of livestock is relatively slow. Intjehatu et al., (2020) stated that the first estrus age can be used as a basis to show that the cattle are sexually mature, because the reproductive organs have functioned so that reproduction can occur. According to Talib and Herawati (2014) buffalo develop well from a young age, where this condition will affect the first estrus and give birth at an earlier age compared to other females whose growth is slower. This means that in the buffalo population there will be faster births, longer productive lifespans and more children born. Arman (2006) reported that buffaloes in Sumbawa reach sexual maturity at the age of 36 - 48 months, and the mating of female buffaloes

occurs for the first time after sexual maturity at the age of 33 months, after passing the first sexual maturity of 29 months.

Pregnancy Rate

The percentage of pregnancy is the number of pregnant females divided by the number of females that mate naturally. The pregnancy rate at the research location was 77.20% (Table 9), while the rest were in the condition that marriage had not occurred. This pregnancy rate is lower than the results of Wahyuni and Souhoka's (2022) research with natural mating patterns, and higher than the results of Lumbantoruan (2019) research that the pregnancy rate in IB marriages is 69.05% and natural mating is 66.90%. The acquisition of pregnancy rates at the study site shows that the fertility rate of livestock at the study site is quite good even though the determination of the mating time is 100% unknown, but the availability of males for the natural mating process is still available. Wahyuni and Souhoka (2022) stated that mating occurs naturally where male buffaloes can know well which females are maligned. Budiarto (2019) added that the factors that affect the pregnancy rate are the time of marriage and the timeliness of marriage.

Birth Rate

The birth rate is the percentage of children born to pregnant mother cattle. The birth rate of Moa buffalo livestock in Moa District is 97.66% (Table 9). The birth rate in this study is higher when compared to the percentage of buffalo births in Waelata District, which is 96.42% and in Simeulue District by 31.70% (Samsuandi et al., 2016). The high percentage of births at the research site shows that the buffalo mother has good fertility. This is because most of the mothers are at a productive age, there is still availability of feed and the mother is in good physical condition during childbirth. Kosi (2002) stated that the factors that affect the birth rate of buffalo calves are the fertility rate of mother and male cattle, mating methods and available feed sources.

Post-Partus Marriage

The mating time after calving in buffaloes is influenced by various factors, such as body condition, feed quality, age, and health management. The time interval between birth and remarriage ranges between 60 to 120 days In many cases, however, it can be shortened by the use of reproductive technologies such as artificial insemination, good feed management, and stress factor reduction. In order to shorten the mating time after calving and improve production efficiency, good management is indispensable in terms of health, nutrition, and supervision of the estrus cycle.

Post-Partus Marriage is the time interval of marriage that occurs after the partus mother. The results of the study showed that postpartus mating in Moa buffalo mothers at the research site was quite long, namely 12,47 ± 0.85 months (Table 9). This is suspected to be due to the traditional extensive maintenance system where farmers do not carry out related control and supervision maternal body condition (BCS - *Body Condition Score*), feed and nutrition management, buffalo age and the influence of stress. The

condition of the female buffalo's body greatly affects the return of the female buffalo after calving. Buffaloes that are in good physical condition and are not too thin or overweight return to mate faster and are ready to mate. In contrast, buffaloes with low BCS or those with nutritional deficiencies can experience prolonged periods of anestrus.

Feed quality greatly affects the reproductive process in buffaloes. Research shows that a balanced diet, including enough protein and energy, can accelerate the return of buffalo to the reproductive cycle. Conversely, malnutrition can prolong the period of anestrus.

The age of the mother also plays an important role in the time of mating again after giving birth. Younger or older buffaloes may take longer to return to mating after giving birth compared to mothers who are at the ideal reproductive age (about 3-6 years).

Stress factors (such as transportation or environmental changes) can prolong the duration of anestrus in female buffaloes. Stress can affect the balance of hormones necessary for ovulation, thus slowing the return of estrus.

Mating after childbirth is also influenced by the level of knowledge of breeders related to the signs of lust/estrus and the determination of mating time. Low control, supervision, the level of knowledge of farmers regarding the signs of estrus and the determination of the right mating time will prolong the time for broods to mate. Most of the respondents with elementary school education, namely 65.00% and 83.33% (Table 2), have never participated in extension activities in the field of animal husbandry.

In addition to the factors mentioned above, a long wallowing time during the dry season along with the time of estrus will delay the male to mate with the mother buffalo, so that the mother buffalo will go through 1 more cycle to re-mate. A long weaning period will also have an impact on the next mating time. This is in line with the opinion (Reksohadipjo, 1984), that the estrus cycle of buffalo livestock is 21 days. Furthermore, Westhuizen et al., (2001) stated that early weaning of calves will accelerate the return of the mother's body condition and the return of hormone secretion that supports ovarian development to shorten the duration of postpartum anesthesia (PPA). The separation of the buffalo cub (gudel) from the mother is all done freely and naturally where the cub and mother separate by themselves. This condition can clearly interfere with the productive period of the parent, and it is difficult to calculate at what age the gudel separates from the parent (Wahyuni and Souhoka, 2022). Haloho and Manurung, (2020) also explained that mother buffaloes need enough protein and other nutrients to allow their bodies to produce reproductive hormones. Buffalo reproductive productivity is disturbed if the protein intake of the buffalo mother is insufficient because weaning occurs naturally because the mother must produce milk for the calf.

Pre-Weaning Death

The mortality rate of pre-weaning children can be the main factor in determining livestock productivity in a livestock business, can be used as an index of maintenance management efficiency and can affect the rate of increase in livestock population in a livestock development area (Rijoli, 2012). The results showed that the percentage of pre-

weaning mortality at the research site was 19.76% (Table 9). This result is quite high when compared to the death rate of buffalo livestock in Waelata District, which is 3.70% (Wahyuni and Souhoka, 2022) and on the land of Lindu, Sigi Regency, which is 3.16% per year due to being trapped in bushes or mud and lack of milk in the age range of 0-6 months (Intjehatu et al., 2020).

Based on the results of the interview, it is known that the high percentage of deaths at the research site is due to the lack of availability of water and animal feed in the dry season which causes insufficient basic needs which further has an impact on death. Traditional extensive rearing patterns can also increase the mortality rate of buffalo livestock. The absence of intensive control and supervision by farmers over the buffalo livestock that is raised, will hinder the processes of saving buffalo calves that should need help from farmers such as adding grass forage and providing drinking water in the dry season as well as ensuring that the cubs are separated from their mothers due to being trapped in ravines or separated by herds of cattle.

Conclusion

From the results and discussions obtained, it can be concluded as follows:

1. A total of 58.33% of respondents of farmers in Moa District, West Maluku Regency Dayar have knowledge and ability in the medium category in detecting birahi, 40.00% of farmers have knowledge and ability in the low category, and 1.67% of farmers have knowledge and ability in the good category.
2. As many as 100% of the respondents of farmers in Moa District, West Maluku Regency Dayar do not have the knowledge and ability to determine the right mating time after partus.
3. The potential productivity of Moa buffalo mothers is as follows: the first mating age is 37.17 ± 2.42 months, the pregnancy rate is 77.20%, the birth rate is 97.66%, the post-partus mating is 12.47±0.85, and the pre-weaning death is 19.76%.

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