Artificial Insemination Program of Beef Cattle in Manokwari Regency

Artificial Insemination Program of Beef Cattle in Manokwari Regency

Arif Haryanto[1], Rudolf O. Faidiban[2], Andoyo Supriyantono[2]

[1]Animal husbandry and animal health services Manokwari West Papua
[2]Aninal Science Department, Papua University Jl. Gn. Salju Manokwari West Papua

E-mail: andoyo@yahoo.com

Abstract. Manokwari is a potential regency to be developed as a center of beef cattle production. One of the activities that have been implemented to increase the productivity of beef cattle is the technology of artificial insemination (AI). The study aims were to determine the success of AI in beef cattle and to evaluate the factors which determine success of AI in Manokwari District. The research was carried out in some districts of AI implementation namely Prafi District, Masni District and Sidey District. The research method was descriptive. The number of respondents were 75 farmers who join in AI program and 5 inseminators. The results of the study indicated that factors determine of the success of AI were thawing, inseminator experience, the number of calf birth, education level of the farmers, the time of AI, the length of work and the number of training. Indicators of artificial insemination were as follow: service per conception (S/C) was 1.8, calving interval (CI) was 12.9 months and calving rate (CR) was 47.11%. Those indicators showed that AI program in Manokwari District was successful.

1. Introduction

Manokwari is one of the districts that has a large population of beef cattle. It has the potential to be developed as a center for cattle production. One of the activities that have been carried out by the local Government is to increase the productivity of beef cattle through Artificial Insemination (AI) specifically for Bali cattle. The AI program in Bali cattle in this area has been implemented since 2000.

There are several areas targeted for the implementation of the AI program in Manokwari, namely Prafi district, Masni district and Sidey district, those three districts have a larger number of beef cattle compare to other districts. The number of beef cattle in Prafi, Masni and Sidey district ia about 3,595; 3,560 and 816, respectively. Total number of beef cattle in Manokwari is about 9,272 (Manokwari in figures,2015) [1].

Although AI technology has been implemented for quite a long time in the regency, the success of AI is still very varied and tends to be low. According to Toelihere (1981) [2], the success of the AI program was influenced by several things including: dams, inseminator skills in depositing semen, timeliness of AI, heat

detection, semen handling and semen quality, especially post thawing motility. The problem in the field is the adoption of AI technology which is still very slow by most farmers. The slow adoption of AI technology according to Bahar et al., (2014) [3] was caused by the lack of socialization to farmers, the ability to detect heat which is often wrong and the maintenance system of animals that is extensively.

The research aims were to evaluate of artificial insemination program of beef cattle in Manokwari Regency and to analyze the factors that influence of AI in Manokwari Regency.

2. Materials and Methods

The method used in this research was descriptive with case study techniques. The object of the case study were farmers who participating in AI and inseminators who involved in implementing AI in Manokwari, especially in the Prafi, Sidey and Masni district.

The sample object in the study were beef cattle farmers who had carried out the AI program. They at least have two cows that had been AI. Total samples were about 75 head of family/acceptor consisted of 41 samples Prafi, 22 samples Masni and 12 samples Sidey.

Some variables observed were service per conception (S/C) and calving interval (CI). Service per conception was a calculated using formula:

$$S/C = \frac{\text{The number of AIneeded in the herd}}{\text{The number ofcowspregnant in the herd}}$$

According to Toelihere (1981) [2], the value of S/C lay in between 1.60 to 2.00. The closer to 1 means the higher fertility rate of dam and sires (frozen semen used in the herd).

Calving interval is the amount of time (days or months) between the birth of a calf and the birth of a subsequent calf, both from the same cow. Toelihere (1981) [2] states the reproductive ability of cow is strongly influenced by the value of CI, where the ideal calving interval is 12 months. Salisbury and Vandemark (1985) [4] stated the average calving interval for beef cattle is 12.6 months.

Calving Rate (C/R) is defined as the number of calves actually produced by a cow divided by the number of potential calves. Bearden et al., (2004) [5] mention calving rate is the percentage of number of calves born from insemination in a herd of cows who have been artificially inseminated. Calving rate was calculated base on location namely Prafi, Masni dan Sidey.

Technical and non-technical factors that are thought to determine the success of AI and are used as supporting variables as follows:

1. Farmers: experience, education, income and knowledge
2. Livestock and Maintenance Management: number of animals, age of animals and parities
3. Straw: age and type
4. Inseminator: knowledge, training

The collected data were analyzed using multiple linear regression using Ordinary least square (OLS) method.

3. Results and Discussion

3.1. Service per Concepcion (S/C)

Service per conception of cow herd in Manokwari regency was 1.8 (Prafi), 1.5 (Masni) and 2 (Sidey), respectively, the average was 1.8. The S/C lays on 1.6-2.00 as reported by Toelihere (1981) [2]. The S/C rate in Manokwari regency was better than

S/C rate in Kebumen regency which was about 2.2 (Hastuti and Nurtini, 2008) [6]. However, when compared to Tharukliling and Hetharia (2014) [7] report in Nimbokrang, Jayapura regency the S/C was about 1.38 to make pregnancy for the cow, the S/C needed for one pregnancy in Manokwari District was still higher. The difference in S/C in Manokwari regency compared to other regency was mainly due to several factors including: the ability to detect heat of cow, the timeliness of reporting of heat,

Technical and non technical factor which affected S/C are treatment and inseminator knowledge ($P<0.05$). Other factors such as farmer knowledge, age of cow, parity and farmer experience did not influence ($P>0.05$).

The intended treatment is thawing with the warm and cold water. The inseminators in Masni conducted thawing with warm water, while in Prafi and Sidey they used cold water. Samsudewa and Suryawijaya (2008) [8] stated that the best thawing method uses warm water about 37°C degrees for 30 seconds. Wulandari and Prihatno (2014) [9] stated that thawing using warm water at 37°C results in higher pregnancy rates than thawing at temperatures 28°-30°C. According to Evans and Maxwell (1987) [10] a temperature of 37.5°C will increase spermatozoa metabolism and be shorten the life of spermatozoa.

The regression model for S/C could be used to predict it due to highly significant ($P<0.01$). The model is as $y=-290.25+5.04x1+76.37x2+18.74x3-0.69x4-1.125x5+3.219x6-0.215x7$. From the model it can be stated that experiences, time of AI, farmer knowledge, age of cow, inseminator knowledge parity and treatment have highly significant to S/C.

3.2. Calving Interval (CI)

Calving interval of three cow herd in Manokwari regency were 13 months (Prafi), 12 months (Masni) and 13.75 months (Sidey), respectively, the average was 12.92 months. Salisbury and Vandemark (1985) [4] stated that the average calving interval for normal beef cattle is 12.6 months. The average of our calving interval was higher than that of normal beef cattle due to farmer was late to inform to the inseminator for AI. Toelihere (1981) [2] stated that the reproductive ability of cow was strongly influenced by calving interval, where the ideal of calving interval was 12 months. Hastuti. and Nurtini (2008) [6] found calving interval in Kebumen regency was 443 days or 14.76 months, it was due to average of age at weaning on AI was longer than that on natural mates. The delay of weaning calf was one of the reasons for the length of estrus after calving.

Technical and non-technical factors that affected calving interval ($P<0.05$) was as follow farmers experience, education, farmer knowledge, parity, knowledge of inseminator and treatment. The model of regression that can be predicted for calving interval ($P<0.01$) is $Y = 0.05+0.0001x1+0.0001x2+0.0001x3-0.001x4+0.001x5+0.002x6+0.005x7+0.002x8$.

Mosher (1987) [11] stated that a high level of education of farmer makes it easier to think rationally and be more open in accepting new things especially those that are beneficial in beef cattle business. Through education the farmers have knowledge, skills and new ways of doing business activities.

3.3. Calving Rate (C/R)

Calving rate of three cow herd in Manokwari regency were 42.14% (Prafi), 66.50% (Masni) and 32.70% (Sidey), respectively, the average was 47.11%. Some reasons for the low of calving rate were 1. Remote area made delay of artificial insemination; 2. Straw container and liquid nitrogen must be located at each artificial insemination post. It made easier to service all the farmers when they need artificial insemination; 3. There is no small field container (1 L of liquid nitrogen). The inseminators used

ordinary thermos filled by ice to carry straw after being thawed from the straw container.

According to Toelihere (1981) [2] C/R rate in cows was 65% - 75%. Partodihardjo (1992) stated that things that can affect the rate of conception are venereal disease, female fertility, the age of livestock, and accuracy in mating animals [12]. He added that pregnancy failure is also common because of failure to detect heat, failure of fertilization, death of the embryo, and failure of development or growth of the zygote.

Delaying mating cow can lead to reproductive failure Zulfahmi (2014) [13]. According to Toelihere (1981) C/R were determined by three factors: 1. Male fertility, 2. Female fertility, 3 [2]. Insemination techniques, precise detection and optimum timing for insemination will increase the number of conceptions and shorten calving interval in a herd of livestock. Partodihardjo (1992) stated that beside male and female fertility, inseminator skills and accidental factors also influence calving interval [12].

Another research by Susilo (2005) was that in wetlands the lowest CR of local cattle was 38.8% and the highest was 47.36%; in the dry land the lowest was 34.61% and the highest was 45.95% [14]. Some factors that can affect CR were male fertility, female fertility, and insemination techniques.

3.4. Inseminator characteristic

We analyze other factors which affected C/R from inseminator side. Based on the analysis, some factors had been influenced were length of work and training of inseminator. According to Herawati et al, (2012) [15] training and work experience highly contributed to the C/R. Oltenacu et al, (1981) [16] stated that someone was categorize a good inseminator if the C/R > 58%. An inseminator was inexperienced and weak if the C/R <42%, and moderate inseminator if the C/R = 50. Model regression for predicting role of inseminator is Y= 3.20+0.29x1+14.25x2.

3.5. Determinants of Successful Artificial Insemination

Based on the analysis of multiple linear regression tests, factors determining the success of the implementation of AI in Manokwari regency were as follows:

1. Thawing with warm water affected pregnancy (S/C) and calving interval
2. Inseminator knowledge will determine the pregnancy (S/C)
3. The number of calves born had highly significant on calving intervals
4. Education level influenced on calving interval
5. The time of insemination in the morning affected the calving interval
6. The length of the inseminator working had an effect on calving rate
7. Inseminator training affected calving rate

4. Conclusion

Some indicators for successfully on artificial insemination in Manokwari regency were low in S/C (1.8); it had normal level of CI (12.92 months) and it had moderate of C/R (47.11%). Some factors determining of successfully on artificial insemination were thawing treatment; inseminator knowledge; parity; education level; time of AI in the morning; length of working; and inseminator training. The role of inseminator on calving was highly affected on length of working and training.

Acknowledgement

We thank to the head of Animal Husbandry and Animal Health Services West Papua, all the inseminators who provided data we need; as well as some farmers who already participated in our research.

References

[1] Manokwari in figures. 2015. *Statistics of Animal husbandry and animal health services* West Papua.
[2] Toelihere, M.R. 1981. *Inseminasi Buatan*. Universitas Udayana Dan ITB. Bandung
[3] Bahar, L.D., S. Baba, dan S.N. Siradjuddin. 2014. Hambatan adopsi Inseminasi Buatan di Kabupaten Barru. *Proseeding seminar nasional Peningkatan Produktivitas Ternak Lokal,* Makassar, 9 Oktober 2014
[4] Salisbury, GW dan Vandemark. MIL. 1985. *Fisiologi dan Inseminasi Buatan Pada Sapi*. **(**diterjemahkan oleh R. Djanuar). UGM press. Yogyakarta
[5] Bearden, J.H., J.W. Fuquay, and S.T. Willard. 2004. *Applied Animal Reproduction.* 6th ed. Prentice-Hall Inc, New Jersey
[6] Hastuti.D. and Nurtini,S. 2008. *Sosial Ekonomi Pelaksanaan Inseminasi Buatan Sapi Potong di Kabupaten Kebumen.* Fakultas Peternakan Universitas Gadjah Mada
[7] Tharukliling, S., and Hetharia, LP. 2014. *J. Agros*: **16** (1) pp 207-213
[8] Samsudewa. D dan Suryawijaya., A. 2008. Pengaruh Berbagai Methode Thawing terhadap Kualitas Semen Beku Sapi. *Seminar Nasional Tekhnologi Peternakan dan Veteriner*. Fakultas Peternakan Universitas Diponegoro. Semarang
[9] Wulandari I.A. dan Prihatno S.A. 2014. *Pengaruh berbagai temperature thawing semen beku terhadap keberhasilan inseminasi pada sapi potong.* Fakultas Kedokteran Hewan Universitas Gajah Mada
[10] Evans.G and Maxwell,W.M.C. 1987. *Salmon·s artificial insemination of sheep and goat butterworth* Sidney Australia
[11] Mosher, AT. 1987. *Menggerakkan dan Membangun Pertanian*. Jakarta: Yasaguna
[12] Partodihardjo,S. 1992. *Ilmu Reproduksi Ternak.* Penerbit Mutiara Sumber Widya Jakarta
[13] Zulfahmi, 2014. *Pengaruh Waktu Inseminasi Buatan terhadap angka kebuntingan sapi turunan simental di Kecamatan sangir Kabupaten Solok Selatan*. Universitas Taman Siswa Padang
[14] Susilo.T. 2005. *Efisiensi Reproduksi Program Inseminasi Buatan terhadap sapi local pada daerah lahan basah dan kering di Kabupaten Magelang Provinsi Jawa Tengah.* Universitas Diponegoro Semarang
[15] Herawati, T., Anneke Anggraeni, Lisa Praharani, Dwi Utami dan Argi Argiris. 2012. *J. Informatika Pertanian* **21**(2) pp 81 – 88
[16] Oltenacu, P A, T R Rounsaville, R A Milligan and R H Foote 1981 *J. of Dairy Sci.*. **64** (10) pp 2096–2104