Causes of low pregnancy rates in beef cattle through artificial insemination technology in Soppeng Regency (case study: performance of the 2018 UPSUS SIWAB)

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Abstract. The objective of this study was to examine the causes of low pregnancy rate in beef cattle through artificial insemination in the 2018 UPSUS SIWAB program in Soppeng Regency. This type of study was exploratory by involving three informants who were considered to know clearly the causes of low pregnancy rate in beef cattle through artificial insemination in the 2018 UPSUS SIWAB program in Soppeng Regency. The informants were beef cattle farmers, inseminator, and the staff of the animal livestock services of Soppeng Regency. The data obtained were analyzed qualitatively using the Delphi method. The results of this study showed that four main factors were obtained, i.e. the motivation of beef cattle farmers for pregnancy diagnosis to their cows by inseminator was still low, the semi-intensive beef cattle maintenance system was not carried out well even some farmers were still maintaining an extensive maintenance system, the location of the beef cattle farmers house was difficult to reach by inseminator, and farmers knowledge about the detection of estrous was still low and subsequently resulted low pregnancy rate through artificial insemination in the 2018 UPSUS SIWAB program in Soppeng Regency.

1. Introduction

Basically, the artificial insemination (AI) program is one of the livestock developments programs that has many advantages, both in increasing the rate of increase in livestock populations and in raising livestock income [1]. Therefore, technically to support the success of AI in the field, it is necessary to conduct an in-depth evaluation of the factors that influencing the success rate of AI, including the quality of frozen semen, condition of beef cattle reproductive organs, inseminator skills, knowledge of farmers in detecting of estrus, recording, and the availability of the farmers in adopting AI technology. Since the UPSUS SIWAB program started in 2017, there have been many changes and evaluations were carried out by the government to oversee the development of UPSUS SIWAB performance (special efforts in increasing pregnancy rate of beef cattle cows) namely the implementation of artificial insemination activities and pregnancy diagnosis [2]. One of the areas in South Sulawesi province that is developing UPSUS SIWAB is Soppeng Regency. Results of the activities of UPSUS SIWAB in Soppeng Regency are shown in table 1.
Table 1. Results of UPSUS SIWAB in the last two and a half years in Soppeng Regency.

| Year   | Period       | AI acceptors | Implementation of AI | Pregnancy diagnosis after AI | Natural mating |
|--------|--------------|--------------|----------------------|------------------------------|----------------|
|        |              | R | T | R | T | R | T | R | T | R | T |
| 2017   | January-December | - | - | 1.188 | 9.413 | 1.398 | 6.213 | - |
| 2018   | January-December | 1.190 | 1.000 | 1.299 | 1.180 | 197 | 644 | 1.246 |
| 2019   | January-June  | 233 | 344 | 254 | 392 | 54 | 340 | 272 |

Source: Livestock and Animal Health Services of South Sulawesi province, 2019

Based on table 1, it is known that the realization (R) of total acceptors has increased from the total target in line with the increasing realization of AI implementation. This raises the argument that beef cattle farmers in Soppeng Regency participated in the use of artificial insemination technology in the UPSUS SIWAB program. However, although the total number of AI acceptors and AI implementations exceeded the target, from January 2017 to June 2019, insemination of beef cattle pregnancy rate decreased from the total target, potentially affecting the calving rate if AI implementation was not immediately evaluated. This condition can occur because the application of AI has not been maximized as an inhibiting factor for the calving of beef cattle [3]. In 2018, in Soppeng Regency it was found that pregnant cattle through natural mating was higher compared to pregnant cattle through artificial insemination. This raises the argument that natural mating has not been replaced by AI technology, thus indicating that the level of farmers’ willingness to adopt of AI technology in Soppeng Regency was still low. The lack of farmers’ willingness to adopt of AI technology can certainly affect beef cattle pregnancy rate, as well as inhibits calving rate of the beef cattle cows. Therefore, the high success rate of artificial insemination in the UPSUS SIWAB program in Soppeng is difficult to achieve.

2. Study methods

This study was conducted in August – October 2019 in Soppeng Regency, South Sulawesi province. This type of study was an exploratory involving 3 informants who were considered to know clearly the causes of low pregnancy rate in beef cattle through artificial insemination in the 2018 UPSUS SIWAB program in Soppeng Regency. The informants were farmers, inseminator, and the staffs of Livestock Services of Soppeng Regency. Source of data used in this study were primary data and secondary data. Method for collecting data was conducting a survey by observation and interview the informants with the help of a questionnaire. The data obtained in the study were analyzed qualitatively using the Delphi method.

3. Results and discussion

The Delphi method was performed in three steps. The first step was obtained seven factors that led to the low pregnancy rate in beef cattle in the 2018 UPSUS SIWAB program in Soppeng Regency. The factors in the first step are shown in table 2.

Table 2. Results of the first round of the Delphi method questionnaire.

| Code | Causes of low pregnancy rates in beef cattle through artificial insemination technology of the 2018 UPSUS SIWAB in Soppeng Regency |
|------|-----------------------------------------------------------------------------------------------------------------------------------|
| A    | Farmers motivation for pregnancy diagnosis by inseminators was still low                                                           |
| B    | Lack of government oversight                                                                                                       |
| C    | The location of farmers houses that were difficult to reach by inseminators                                                       |
| D    | The less of inseminator incentives                                                                                                 |
| E    | Reporting systems by inseminators were complicated and inaccurate                                                                |
| F    | Farmers were less interested in AI because there was no concrete evidence                                                        |
| G    | The semi-intensive maintenance system was not carried out well even some breeder still maintain an extensive breeding system      |
| H    | Farmers knowledge about estrous detection was still lacking                                                                       |
Table 2 shows that in the first step, there are seven factors obtained the causes of low pregnancy rates of beef cattle through artificial insemination technology in the UPSUS SIWAB program in Soppeng Regency. The first step was obtained based on open-ended questions so that the seven factors causing the low pregnancy rate in beef cattle through AI in the 2018 UPSUS SIWAB program are not accurate enough to represent all of the existing factors. For this purpose, the results of the first step were scoring at each factor to obtain the results of the second step. The factors in the second step that have scoring of from 1 to 7 (very influential to no influential) are shown in table 3.

**Table 3. Results of the second step of the Delphi method questionnaire.**

| Informant                             | Causes of low pregnancy rate in beef cattle through AI technology of the 2018 UPSUS SIWAB in Soppeng Regency |
|---------------------------------------|---------------------------------------------------------------------------------------------------------|
|                                       | A | B | C | D | E | F | G | H |
| Farmers                               | 2 | 6 | 4 | 8 | 7 | 5 | 1 | 3 |
| Inseminators                          | 1 | 8 | 2 | 6 | 5 | 7 | 4 | 3 |
| Staffs of Livestock Services in Soppeng Regency | 1 | 7 | 3 | 6 | 2 | 8 | 5 | 4 |
| **Total**                             | 4 | 21| 9 | 20| 14| 20| 10| 10|

A. Farmers motivation for pregnancy diagnosis by inseminators was still low
B. Lack of government oversight
C. Location of farmers houses that were difficult to reach by inseminators
D. Less of inseminator incentives
E. Reporting systems by inseminators were complicated and inaccurate
F. Farmers were less interested in ai because there was no concrete evidence
G. The semi-intensive maintenance system was not carried out well even some farmers still maintain an extensive breeding system
H. Farmers knowledge about estrous detection was still lacking

Out of from seven factors (table 3) that causes of low pregnancy rate in beef cattle, five factors were obtained based on the assumption. Those factors were considered more influencing low pregnancy rate in beef cattle. The lack of government oversight factor was considered not very influential on the low pregnancy rates of beef cattle because based on the informant’s explanation that although not all regions were able to be reached, the government was actively conducting supervision in the form of socialization and counseling both formally and informally. The low incentive factor for inseminators was also considered less influential on the low pregnancy rates of beef cattle because most farmers did not know the incentives paid by the government to inseminators. According to the inseminator and the staff of Livestock Services in Soppeng Regency, the obstacles that hampered the accuracy of reporting systems such as cellphone networks were not supported, consequently inseminator had a difficulty to report activities related to AI. To strengthen the suspicion, a third step with a score of 1 to 5 (influential to no influential) was built and shown in table 4.

In table 4, from five factors that cause the low pregnancy rate of beef cattle obtained four factors based on the assumption that the lower the total. The factors were considered to be more influential. The complicated reporting system factor was considered less influential on the low pregnancy rate of beef cattle because according to farmers’ explanation that most of them did not know overall related to reporting system. The third step was the final step of the Delphi forecasting method series in this study in which four main factors were obtained which led to the low pregnancy rate of beef cattle through artificial insemination technology in the 2018 UPSUS SIWAB program in Soppeng Regency which can be seen in table 5.
Table 4. Results of the third step of the Delphi method questionnaire.

| Informant                      | Causes of low pregnancy rate in beef cattle through AI technology of the 2018 UPSUS SIWAB in Soppeng Regency |
|-------------------------------|---------------------------------------------------------------------------------------------------------|
|                               | A  | C  | E  | G  | H  |
| Farmers                       | 2  | 4  | 5  | 1  | 3  |
| Inseminators                  | 1  | 2  | 5  | 4  | 3  |
| Staffs of Livestock Services  | 1  | 3  | 2  | 5  | 4  |
| in Soppeng Regency            | 4  | 9  | 12 | 10 | 10 |

A Farmers motivation for pregnancy diagnosis by inseminators was still low
C Location of farmers houses that were difficult to reach by inseminators
E Reporting systems by inseminators were complicated and inaccurate
G The semi-intensive maintenance system was not carried out well even some farmers still maintain an extensive breeding system
H Farmers knowledge about estrous detection was still lacking

Table 5. The low pregnancy rates of beef cattle through AI in the 2018 UPSUS SIWAB.

| The low pregnancy rates of beef cattle through AI in the 2018 UPSUS SIWAB | Score | Rank |
|------------------------------------------------------------------------|-------|------|
| Farmers motivation for pregnancy diagnosis by inseminators was still low | 4     | 1    |
| The semi-intensive maintenance system was not carried out well even some farmers still maintain an extensive breeding system | 7     | 2    |
| The location of farmers houses that were difficult to reach by inseminators | 10    | 3    |
| Farmers knowledge about estrous detection was still lacking             | 10    | 4    |

As shown in table 5, there were four main factors as the causes of low pregnancy rate in beef cattle through artificial insemination in the UPSUS SIWAB program in Soppeng Regency. The level of farmers’ motivation for pregnancy diagnosis that carried out by inseminators was still low. However, the farmers’ belief and hope for the success of artificial insemination were quite high. Therefore, farmers’ opinion that pregnancy diagnosis was no an important thing to them, on the other hand, they need only to contact the inseminator if the cows approaching to have birth. However, if the cows did not become pregnant after artificial insemination, usually the farmers considered to do natural mating for their cows or sell their cattle with low prices. This condition affects the intention of the farmers to adopt AI technology.

Intention is the desire of someone to perform a behavior in order to achieve certain goals based on the attitudes and beliefs of that person as well as the beliefs and attitudes of people who influence them to do a certain behavior [4]. Intention is a determinant and disposition of behavior, so that individuals have the right opportunity and time to display the behavior clearly [5]. Obstacles that prevent inseminators from carrying out pregnancy diagnosis such as farmers do not spend enough time to facilitate this activity. Furthermore, necessary equipments in doing pregnancy diagnosis are mainly did not prepared well by the farmers. Such condition had affected and impact on the low pregnancy rate of beef cattle through AI. Technically, this affects the inseminator reporting system to the (government) information center. However, in achieving the success of the goal of artificial insemination in UPSUS SIWAB, this can be a serious problem if it is not immediately evaluated because it impedes specific efforts to accelerate beef cattle population so that the target set cannot be achieved. Preferably, beef cattle that were not pregnant need to be immediately re-inseminated or if there was indeed a reproductive disturbance, they should be handled as soon as possible while for pregnant cattle need to be reported to
the owner so that feeding system will be conducted according to their pregnancy status [6]. Realization in Soppeng Regency if the dry season arrived, feed will be very difficult to found out so that there was no other choice but to provide rice straws feeding to cattle without being fermented because of the limited knowledge of farmers on feed fermentation was still lacking.

In addition to the level of motivation of farmers’ who were still lacking on pregnancy diagnosis of their cows, livestock raising system factors also cause low pregnancy rate of beef cattle through artificial insemination in the UPSUS SIWAB program in Soppeng Regency. Farmers in Soppeng Regency maintained a semi-intensive maintenance system and some even maintain an extensive maintenance system. The semi-intensive maintenance system must be followed by appropriate treatment for insulated beef cattle, which was caged with feeding and medicines that are in accordance with their pregnancy status so that the focus was on monitoring the inseminated cattle while preventing inbreeding through natural mating. But the realization, although the maintenance system was semi-intensive, farmers did not provide appropriate feed and medicine and some areas still maintain extensive maintenance systems on the grounds that it saves time making it possible to did other work, did not need to provide food and drinking water, and did not need labor. The semi-intensive maintenance system was not carried out well and some breeders still maintain an extensive maintenance system that causes beef cattle not to get pregnant. The inhibiting factor which was suspected as the cause of the low productivity of livestock is the maintenance management that has not been optimal, which is characterized by a system of maintenance that is extensive (traditional), a sideline business (non-agribusiness oriented) and does not pay attention to production inputs [7]. In addition, breeding and selection systems that are not directed so that the performance of livestock is very diverse. The high enthusiasm of farmers is not followed by their pro-active attitude in changing the maintenance system [8] because more than 90% of beef cattle farmers in South Sulawesi Province are still based on smallholder farms that are maintained by small number of cattle [9] it means that these condition fully occurs because livestock was only a side work so that farmers do not have enough seriousness to pursue the livestock sector as the main job.

The next factor that causes the low pregnancy rate of beef cattle through artificial insemination in the UPSUS SIWAB program in Soppeng Regency was the location of farmers’ cows that cannot be reached by inseminators. The location of farmers was difficult to reach by inseminators due to the limited number of inseminators in Soppeng Regency. The location and attitudes of farmers are known to be far more important as determinants of adoption than are socio-economic characteristics [10]. The success of AI implementation does not only depend on the local government or officials, but the attitude and willingness of the farmers to support the success of the AI are also crucial. The successful implementation of AI must be built by good cooperation between governments and breeders. Good cooperation between governments and farmers can be seen from the enthusiasm of farmers to participate in extension program held by the government. The intensity of extension program by the government was sufficient, but even though the intensity of farmers participating in extension program is quite high. Farmers will be motivated if they prove themselves that AI cattle yields are very profitable. When the farmers will decide to adopt the technology, then the consideration factor of the farmer is not only from the perspective of technology acceptance from the instructor, but the benefits to be received or the psychological process that occurs in them [11]. Breeders in Salokaraja Sub-District, Soppeng Regency prefer to use AI rather than natural mating, but some of them still concerned about the risk of maternal death during calving because the calf born are relatively larger if AI is conducted [12, 13]. The role of extension program in building farmers’ awareness and socializing of AI is very important to encourage the increase of knowledge and preferences of farmers about AI [14]. Realization in Soppeng Regency that the knowledge of farmers in the detection of estrous was still lacking the same as knowledge of the specific uses of artificial insemination and signs of pregnancy in beef cattle. The success and failure of AI can be influenced by several factors. Factors that influence the success of AI were livestock raising systems, knowledge of the signs of estrous, and the speed of information to officers about the state of estrous of livestock [8]. Most farmers have little knowledge of technology which affects the majority of farmers are not sure to adopt the technology because of the lack of knowledge they have but after getting used to the technology, farmers will consider re-adopting where more farmers' knowledge about
something related to new innovations, the more likely they are to have a positive attitude towards technology adoption [15]. Other factors that influence the success of AI are quality of semen, oocyt quality, AI time, inseminator competence, handling and deposition of semen during AI [16]. Farmers play a role in the early detection of estrus [17] and early diagnosis of simple and easy pregnancy can be done by farmers by looking at the emergence of estrus on the 21 day after artificial insemination [18]. Therefore, it needs to be evaluated because farmers' knowledge about AI affects the rate of adoption [19]. However, the realization in Soppeng Regency, farmers are often wrong in detecting estrous or even do not know at all. Lack of knowledge of farmers about the detection of estrous in beef cattle also has an impact on the low number of pregnancies of beef cattle through artificial insemination in the UPSUS SIWAB program in Soppeng Regency.

4. Conclusion and suggestion
There are four main factors, namely the motivation of farmers for their cows to diagnose the pregnancy by inseminators was still low, the semi-intensive beef cattle maintenance system was not carried out well, some even maintain an extensive maintenance system, the location of farmers' houses was difficult to reach by inseminators, and farmers knowledge about the detection of estrous were still lacking which causes the pregnancy rate of AI UPSUS SIWAB in Soppeng Regency in 2018 could not reach the target.

To avoid the failure of government programs, what needs to be done is an in-depth evaluation of systems that support the success of artificial insemination. In addition, the most important thing to do is provide regular socialization and extension program to both increase the knowledge of farmers and encourage them to contribute fully in the livestock sector by directly showing conclusive evidence that implementing artificial insemination if it is well-maintained will be beneficial for example by holding livestock contests.

References
[1] Sirajuddin S N, Lestari V S and Fadillah N S 2013 Perbandingan pendapatan peternak sapi Bali yang melakukan program inseminasi buatan (IB) dan tidak melakukan program inseminasi buatan (IB) di Kecamatan Soppeng Riaja Kabupaten Barru Jurnal Ilmu Ternak 13(1) 1–3
[2] Direktorat Jenderal Peternakan dan Kesehatan Hewan 2018 Pedoman Pelaksanaan UPSUS SIWAB Tahun 2018 (Jakarta: Kementerian Pertanian Republik Indonesia)
[3] Yusuf M, Syamsu J A, Rahim L and Ali H M 2010 Studi Uji Performans Ternak Sapi Bali Di Kabupaten Barru, Sulawesi Selatan. Seminar Nasional Peningkatan Akses Pangan Hewani melalui Integrasi Pertanian-Peternakan Berkelanjutan Menghadapi Era ACFTA (Jambi: Fakultas Peternakan Universitas Jambi)
[4] Setyani U 2007 Hubungan Antara Konsep Diri Dengan Intensi Mencontek Pada Siswa SMA Negeri 2 Semarang Skripsi (Semarang: Program Studi Psikologi Fakultas Kedokteran Universitas Diponegoro)
[5] Sukirno R S H and Sutarmanto H 2007 Faktor-faktor yang mempengaruhi intensi membeli produk wayang kulit pada masyarakat suku Jawa Psikologika 24 119–31
[6] Said S 2017 Peranan Teknologi Reproduksi dalam Mendukung Program Upaya Khusus Sapi Induk Wajib Bunting (UPSUS SIWAB) Untuk Program Peternakan Berkelanjutan Seminar Nasional Peternakan 3 (Makassar: Universitas Hasanuddin)
[7] Sultan R 2018 Kajian pelaksanaan program inseminasi buatan dalam mendukung program pencapain sejuta ekor sapi pemerintah Sulawesi Selatan Agrovital Jurnal Ilmu Pertanian 3(2) 87–92
[8] Sibagariang M, Lubis Z and Hasnudi 2010 Analisis pelaksanaan inseminasi buatan (IB) pada sapi dan strategi pengembangannya di Provinsi Sumatera Utara Agrica Jurnal Agribisnis Sumatera Utara 3(2) 25–33
[9] Sirajuddin S N, Hastang, Lestari V S and Rosmawaty 2019 Livestock ecology research on institution and traditional sharing system in cattle farms Eur. J. Bio Sci. 13 239–44
[10] Sirajuddin S N, Indriati S, Bahar L D, Rahman A A T and Razzaq A A T 2018 Social economic
Factors that affect cattle breeder’s willingness to pay for artificial insemination programs. *Bulg. J. Agric. Sci.* **24**(4) 574–80

[11] Baba S, Sirajuddin S N, Abdullah A and Aminawar M 2014 Hambatan adopsi integrasi jagung dan ternak sapi di Kabupaten Maros, Gowa dan Takalar *Jurnal Ilmu dan Teknologi Peternakan* **3**(2) 114–20

[12] Sirajuddin S N, Asnawi A, Syawal S and Jamal M 2016 Peningkatan Adopsi Teknologi Inseminasi Buatan pada Sapi Potong di Kecamatan Lalabata, Kabupaten Soppeng *Prosiding Seminar Hasil Pengabdian* (Denpasar: Lembaga Penelitian Dan Pemberdayaan Masyarakat (LPPM) Unmas)

[13] Bahar L D, Sudirman and Sirajuddin S N 2017 The breeders willingness to pay on artificial insemination in Bali cattle *Entom. App. Sci. Lett.* **4**(3) 34–37

[14] Baba S and Risal M 2015 Preferensi dan Tingkat Pengetahuan Peternak tentang Teknologi IB di Kabupaten Barru *Prosiding Seminar Nasional Peternakan Palu* pp 334–39

[15] Roumei X, Yanrui W and Jingdong L 2016 Analysis of breeders’ willingness to adopt genetically modified insect-resistant rice in China *China Agric. Econ. Rev.* **8**(3) 368–82

[16] Saacke R G 2008 Insemination factors related to timed AI in cattle *Theriogenology* **70**(3) 479-484

[17] Roelofs J, López-Gatius F, Hunter R H F, Van Eerdenburg, F J C M and Hanzen C 2010 When is a cow in estrus? Clinical and practical aspects *Theriogenology* **74**(3) 327-44

[18] Tophianong T S, Agung B and Erif M N 2014 Tinjauan hasil inseminasi buatan berdasarkan anestrus pasca inseminasi pada peternakan rakyat Sapi Bali di Kabupaten Sikka Nusa Tenggara Timur *Jurnal Sain Veteriner* **32**(1) 46–54

[19] Sirajuddin S N, Sudirman I and Bahar L D 2018 Relationship between breeder characteristics and adoption of artificial insemination in Bali cattle *Europ. J. Sustain. Dev.* **7**(3) 143–50