A. Introduction

Food products of animal origin as one of the most basic needs, food needs to get attention from the aspect of its availability (Syakir, 2015). Food is the most important basic need in fulfilling the human rights of every individual (Suryana & Munawar, 2017). Foodstuffs of animal origin such as meat, eggs, and milk are easily contaminated by microorganisms which cause food of animal origin to be easily damaged (Lestariningsih, Azis, & Khopsoh, 2019). Beef is a source of animal protein that is in great demand by people in Indonesia. According to Adawiyah et al. (2016) that, the factors that determine the level of animal food consumption in Indonesian society increase, because people's purchasing power for beef is quite high. The need for beef is quite high,
so market opportunities for meat and beef cattle have increased enough so that these opportunities can be utilized by small farmers, large entrepreneurs, and clothing (Dirjenak, 2017). The calf is the term for livestock calves from birth to approximately 8 months of age. Calves are also replacement stock livestock. Giving supplements to pre-weaning calves at the beginning of lactation is expected to be able to control the causes of a decrease in the mother’s ability to meet the nutritional needs of her calves. Calves must receive special attention from breeders, considering the mortality rate and disease resistance (Affandhy, 2013), the calf mortality rate in smallholder farms is still quite high, ranging from 7-27%.

The development of the livestock sub-sector in Indonesia, especially Southeast Sulawesi, needs to be increased, this is because the need for livestock products tends to increase from year to year in line with the increasing awareness of the nutritional needs of the community. However, the increase in demand is not balanced with the increase in livestock population. Southeast Sulawesi is one of the livestock development centers which have quite potential natural resources for beef cattle because it has a relatively large land area. BPS Bombana Regency (2020), the spread of the cattle population in Southeast Sulawesi in 2020 covers seventeen urban districts with a total of 419,882 heads. Based on these data, there is a population of 58,102 in Bombana District.

Bombana Regency is a potential area for the development of a cattle business because it is an agricultural area where the majority of the population lives by farming and has relatively large cattle grazing land. The types of cattle that are generally kept are Bali cattle which have relatively high adaptability, disease resistance, and high fertility. Special Efforts for Obligatory Breeding Cattle (UPSUS SIWAB) are one of the government’s efforts to accelerate the increase in the beef cattle population in a sustainable manner. The scope of UPSUS SIWAB activities includes handling reproductive disorders, AI and natural mating services, controlling the slaughter of productive female cattle, and fulfilling forage and concentrates. BPS Bombana Regency 2020 South Poleang District is one of the three sub-districts with the largest population, namely 4,677 of the total population of 58,102 Bali cattle in Bombana. To find out the number of calves born in the UPSUS SIWAB program in South Poleang District, it is necessary to evaluate one of the UPSUS SIWAB activities, namely the IB evaluation in the UPSUS SIWAB program which can be calculated from the first age of the IB, the number of times a newly pregnant IB, duration of pregnancy, distance of giving birth and birth weight.

The government at the end of 2016 launched the Compulsory Pregnancy Cow Program (SIWAB). This program is supported by the Regulation of the Minister of Agriculture of the Republic of Indonesia Number 48/Permentan/PK. 210/10/2016 concerning Special Efforts to Accelerate the Increasing of Pregnant Cattle and Buffalo Populations. The problem that this program wants to solve is to increase meat production to balance supply and demand in the country which is currently increasing. According to Ditjennak (2017), UPSUS SIWAB is an integrated activity to accelerate the increase in the cattle population in a sustainable manner. The government’s program to increase the population of beef cattle is by reducing the slaughter of productive cows and expanding the reach of the cross-breeding program for local cows with artificial insemination (AI). Improving AI activities in Indonesia is currently underway and will continue to increase livestock population, quality, and production.

One effort that can be taken to increase meat and calf production is to improve the genetic quality of livestock with the UPSUS SIWAB program through the Artificial Insemination (IB) or natural mating intensification (INKA) program. Therefore, it is necessary to evaluate the number of calves born in the UPSUS SIWAB program in South Poleang District, Bombana Regency, to find out the number of calves born as one of the UPSUS SIWAB program activities in Bombana District, especially South Poleang District.

B. Methodology

1. Population and Sample

The population in this study was taken by sampling, namely breeders who have at least one female cow that has given birth and participated in the UPSUS SIWAB program. From the IB report on UPSUS SIWAB activities in Bombana Regency in 2017-2020 100 farmers in South Poleang District were involved in the UPSUS SIWAB program. Due to the population that is spread out between these locations, the sample was taken by purposive sampling with a minimum number of respondents calculated using the formula according to Husein (2001) as follows:

\[ N = \frac{N}{1 + Ne^2} \]
Information:
N = Total Population
n = Number of Samples
e = Error rate (10%)

An error rate of 10% is used based on a population of not more than 2000 so that the number of samples obtained is:

$$n = \frac{N}{1 + Ne^2}$$

$$n = \frac{100}{1 + 100(10\%)^2}$$

$$n = \frac{100}{1 + 100(0.01)}$$

$$n = \frac{100}{2}$$

n = 50 breeder

2. Parameters
Parameters observed in this study were age at first Artificial Insemination (AI), the number of times newly pregnant of Artificial Insemination (S/C), duration of pregnancy, calving interval (CI), and birth weight.

3. Types and Data Retrieval
The type of data used is quantitative data, namely data in the form of numbers which include the number of AI services, the number of females who are AI, all pregnant females as a result of AI, the number of females who are pregnant as a result of the first AI, Data on Realization of Artificial Insemination Activities, and Data on birth recapitulation Artificial Insemination activities. The number of days/months between one birth and the next birth, the number of farmers served by AI.

Sources of data used in this study are primary and secondary data. Primary data were obtained from questionnaires given to farmers about AI implementation, knowledge of farmers about signs of lust, and reproductive changes that refer to reproductive efficiency from AI implementation. Secondary data were obtained from IB cards or the results of recording the implementation of AI by livestock officers and inseminators in South Poleang District, Bombana Regency.

4. Data Collection Method
The data collection techniques used in this study were: (1) Observation, namely direct observation at the research location, in this case, cattle breeders who receive Artificial Insemination (AI) technology services in South Poleang District, Bombana Regency. (2) Interviews, namely data collection by conducting direct interviews with cattle breeders who receive Artificial Insemination (AI) technology services and livestock workers and inseminators who are research respondents. To facilitate the interview process, a questionnaire was used or a list of questions that had been prepared according to research needs.

5. Data Analysis
The data obtained were analyzed descriptively using Microsoft Excel which was tabulated and then the percentage, error rate, and number of samples were calculated using the following formula:

$$N = \frac{N}{1 + Ne^2}$$

Information:
N = Total Population
n = Number of Samples
e = Error rate (10%)

Service per Conception = \( \sum \) IB until pregnancy occurs
= \( \sum \) pregnant acceptor

Information:
- \( \sum \) AI until pregnancy occurs: the number of times in AI until pregnancy occurs
- \( \sum \) pregnant acceptors: Total pregnant females
- \( \sum \) Straw used: number of straws used until the cattle became pregnant
- Calving Interval = births in the 1st month minus births to (i-1)

C. Result and Discussion

1. Profile of Breeders in South Poleang District

Identification of the characteristics of the respondents was carried out to determine the identity of the breeders involved in this study. The respondents referred to in this study were the breeders who were sampled. However, a farmer cannot be separated from factors that can affect his business in raising livestock, including age, education, and experience in raising livestock.

Table 1. Characteristics of Respondents in South Poleang District, Bombana Regency

<table>
<thead>
<tr>
<th>No.</th>
<th>Characteristics</th>
<th>Sample Total (people)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ages</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-20-30</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>-31-50</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>-&gt;50</td>
<td>19</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>2.</td>
<td>Rate of Education Pendidikan</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Elementary school/equivalent</td>
<td>32</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>- Junior High School/equivalent</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>- Senior High School/equivalent</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>- Bachelor</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>3.</td>
<td>Breeding Experiences</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-&lt;5 years</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>-5-10 years</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>-&gt;10 years</td>
<td>41</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Primary Data, 2021

Based on Table 1, it can be seen that half of the respondents are at an average age of 31-50 years which can be classified as the productive category. As known that residents are classified as workers if they have entered working age (15-64 years old). Age 31-50 years with a percentage of 50%, aged 20-30 years as much as 12%, while breeders who are old/less productive> 50 years as many as 19 people with 38%.

Communities participating in the development of artificial insemination (AI) in the UPSUS SIWAB program in the South Poleang District are classified as productive or working age. With a high percentage of productive age, it is hoped that it will guarantee a high level of work productivity. Age has an influence on work productivity in types of work that rely on physical exertion. The people of South Poleang District, Bombana Regency, who were the respondents, on average had different levels of education. Elementary school education was 32 people or 64%, junior high school was 6 people or 12%, high school was 10 people or 20%, and undergraduate was 2 people or 4%. From these data, it can be seen that the level of education of respondents who raise beef cattle is still low.

Farmers or respondents who have a good mindset can quickly adopt the development of information technology in the livestock sector. High education does not affect rural communities in raising cattle. In this case, it has been proven that the people of South Poleang Subdistrict who are respondents have more elementary school education than people with higher education. This is following the opinion of Husein (2021) which states that education is an effort carried out by a person or group of people to become adults or achieve a higher level of life or livelihood in a mental sense. Based on data from farming experience, almost all of the respondents’ farming experience was quite long, namely >10 years for as many as 41 people or 82%, 5-10 years for as many as 8 people or 16%, and <5 years as many as 1 person or 2%. The longer a person has been in running a business, the more experience he has in selecting strategies for running a business,
so that with a high percentage of farming experience it is hoped that he will be able to help breeders in developing their business.

The respondent’s farming experience illustrates the length of time he has been in the livestock business which is generally hereditary and is passed down from his parents and the surrounding environment. In general, the experience of farmers has a positive correlation with productivity, where the longer the experience of farming, the more productivity it produces, because the higher the level of experience in farming, the better the skills and attitudes towards the livestock business it manages. There is only 1 AI (inseminator) service officer in South Poleang District who handles the area, with a Bachelor of Agriculture background, and is active in the livestock sector. Expertise as an inseminator is obtained through Insemination Education (specifically AI) as a condition for becoming an inseminator. This IB education is obtained through regional and outside IB training. This is expected so that the inseminators who carry out their duties and roles are truly qualified.

The AI service system that is carried out is active (inseminators come to breeders). This indicates that inseminators are very concerned about AI services to the livestock community. To facilitate reporting/requests, inseminator AI make reports and carries them out regularly in carrying out their duties. This indicates that the AI program in South Poleang District is well structured and the performance of the inseminators is very good.

The inseminator has long experience as an inseminator starting from 1995 until now so he is skilled and able to guide livestock owners so that they can detect estrus in livestock on their own. This guidance is necessary because the success of AI is not only determined by the accuracy of the detection of estrus by inseminators but also by livestock owners in detecting heat.

2. Livestock Maintenance System
The livestock rearing system in this study was carried out extensively, namely, cattle were kept in pastures, all cattle activities were carried out in pastures, livestock were kept freely grazing that grew naturally and some plants were intentionally planted for livestock feed purposes such as elephant grass, grass king and queen. For the mating system, cows that are going to be AI or are in heat are put into a pin cage located in the middle of the pasture for AI to be carried out, then the cows that have been AI are separated or brought home are usually tied up near the breeder’s house for about 1 week to facilitate evaluation. In this rearing system, the activities of mating, enlargement, growth, and fattening are carried out in the pasture. The advantage of this maintenance system is that production costs are very minimal (In extensive maintenance, nutrients derived from feed consumed by livestock are used by 65%-85% for basic living needs).

3. AI Success and Number of Calves in South Poleang District
Handiwirawan & Subandriyo (2007) argues that the evaluation of the efficiency of AI activities that are commonly carried out, namely S/C, CR, and NRR, the better the numbers of these three parameters, the goal of insemination biotechnology will be to achieve better reproductive efficiency which can affect the development of the cattle population in a region. The success rate of the AI program in this study was assessed from the age at first AI, Service per Conception (S/C), length of pregnancy, Calving Interval (CI), and birth weight.

| Table 2. The success of AI and the number of calves in the South Poleang sub-district |
|---------------------------------|-----------------|-----------------|
| No.                            | Parameters      | Mean            | Standard Deviation |
| 1.                             | First Age of AI | 4.14            | 0.9              |
| 2.                             | Service per Conception | 1.52          | 0.5              |
| 3.                             | Pregnancy Duration | 9.94         | 0.24             |
| 4.                             | Calving Interval | 12.39           | 2.42             |
| 5.                             | Birth Weight    | 29.86           | 5.12             |

Source: Primary Data 2021.

3.1. First Age of Artificial Insemination
The average age of first-breeding Simental bulls is not known because the mating system uses AI where most of the bulls are kept until the age of approximately 4 years, while the female cattle are approximately 6 years old. Female cows were first mated at 19.87 months, this is following the opinion of Handiwirawan & Subandriyo (2007) who stated that the age at which Simental females were first mated was 18-24 months. The results of the study showed that the age of the first AI in the South Poleang District, Bombana Regency was 4.14 ± 0.9.
The age at which the animals were first mated has two importance. Marriage at a young age can shorten the generation interval thereby increasing the degree of selection response to certain genetic traits. The faster the livestock are mated, the faster the livestock can produce so that the livestock business is more economical. Under certain conditions, the mating of females is deliberately postponed with the intention that the cattle do not give birth too small to avoid dystocia (Lindsay, Entwistle, & Winante, 1982). The age and body size of heifers at the time of mating for the first time need attention so that a high conception rate is obtained and prevents difficulties with calving. Heifers that are not bred until they exceed the age and body size that should have been mated for the first time will cause low reproductive performance throughout their lives.

3.2. Service per Conceptions

Service per Conception is the number of AI services until a female becomes pregnant. From the results of the study, the S/C value ranged from 1-2 times with an average of 1.52 ± 0.5. According to Toelihere (1985), the normal S/C value for the Indonesian region is 1.60 - 2.00. The S/C ratio in South Poleang District, which on average showed 1-2 times of insemination, and then the cattle become pregnant, showed that the S/C in the study area was very good. The lower the S/C value, the higher the livestock fertility level. The high value of S/C is caused by delays in breeders and AI officers in detecting heat and the wrong time for AI, delays in AI cause pregnancy failure. Factors that affect the level of pregnancy include the skills of inseminator officers.

The implementation of AI in the South Poleang District is carried out by inseminator officers who have long experience in inseminating. In addition, inseminators in the research area have certificates of insemination and permits to carry out artificial insemination (SIMI) and have PKB (Pregnancy Examination) expertise, this is following Dirjenak (2016) which states that technical implementation of AI in the field requires officers who have the skills something that is not easy for everyone to do. If the implementation of IB in the field is handed over to officers who have not or have not attended enough AI technical training, then this is not permitted. To be able to carry out artificial insemination, an inseminator must have a Permit to Perform Artificial Insemination (PAI) issued by the service that handles the functions of livestock and animal health in the local province.

AI is carried out after the breeder reports to the inseminator officer who will then come to the breeder to carry out AI. Ax et al (2016) added that inseminator skills in AI techniques include thawing, cement deposition, and timeliness of AI. The thawing process is carried out with water and it is recommended that the temperature of the water be increased slowly to reduce the death rate of sperm cells because the effect on the thawing process is the same as during freezing.

Ax et al (2016) added that the timing of AI is just before ovulation, that is, if the cow shows signs of heat in the afternoon, then AI will be held the following morning. The implementation of AI should not be done during the day because the cervical mucus thickens during the day, while in the morning, evening, and night the cervical mucus becomes watery. This also has an impact on the success of AI during the day which is lower than in the morning, evening, and night. Spermatozoa are also very susceptible to hot sunlight so AI during the day is less profitable.

Apart from the human factor, the fertility of livestock is also very influential, females of exotic breeds tend to have low fertility when in AI, however, when bred naturally (using studs) it will be better. To get a uniform lust at the desired time, you can synchronize the lust. There are several kinds of synchronization methods, ranging from the very simple to the use of hormones. The simplest synchronization method is to change the pattern of livestock exposure to light because the heat in cattle is affected by the length of daylight. In addition, it can also be done by mixing the studs suddenly. Females are separated from males and then suddenly mixed with males, this can stimulate females to lust.

3.3. Pregnancy Duration

The duration of gestation is the period from fertilization to normal delivery (Jaenudeen & Hafez, 2000). The duration of gestation differs from one breed of livestock to another. In this study, the duration of gestation in Bali cattle in South Poleang District, Bombana Regency was 8.94 ± 0.24.

The duration of pregnancy is calculated from the distance between the implementation of artificial insemination (B date) and the child's birth date. The duration of gestation is influenced by the type of cow, sex, number of calves conceived, and other factors such as the age of the mother, season, genetic traits, and geographical location (Jaenudeen & Hafez, 2000). Meanwhile, according to Astuti et al. (1999), livestock genetic factors determine the ability of livestock, while...
environmental factors provide opportunities for livestock to display their abilities. This situation reflects that Bali cattle have a fairly good adaptability to the environment, as a result, their reproductive performance is no different from their area of origin.

As stated by Pane (1991), Bali cattle have good adaptability to new environments, both to temperature, air, humidity, and wind, as well as to land conditions, feed, and disease. Whereas PO cattle in Sungai Bahar District had a gestation period of 285.73 ± 6.00 days. This situation has a shorter gestation period (285.73) when compared to the Sultan’s (1988) report on the duration of gestation for PO cattle reared in Batumarta for 288.65 days. This is due to differences in the pattern of rearing PO cattle, both the quality of the feed given to the PO cattle and the quantity of feed given at the time of pregnancy, if both the quantity and quality of feed are given to meet the cow’s needs, or vice versa the feed given does not meet the needs, the result is strongly influenced by sex, climate, food conditions and age of the parent.

### 3.4. Calving Interval

The calving interval is one of the reproductive performances that need to be known because the regularity of calving once a year ensures the continuity of livestock production. The success of Artificial Insemination in Bali cattle in South Poleang District, Bombana Regency can be seen in Table 2. The results showed that the calving distance for Bali cattle in South Poleang District, Bombana Regency was ±12 months, this figure was in ideal conditions. The standard calving interval is set to 365 days. While the amount of CI is based on Permen No.19/Permentan/OT.140/2/2010 concerning General Guidelines for the 2014 Beef Self-Sufficiency Program (BSSP), namely 15-21 months with an average of 17.5 months. the ideal calving distance in cows is 12 months, namely 9 months of pregnancy and 3 months of lactation, but in reality, the spacing between calving and remarriage is generally long enough so that the spacing of calving in cows can be more than 12 months. Astuti et al. (1999) stated that if there is a long spacing between children it is mostly due to the long intervals of birth and marriage (days open).

The results of this study were also supported by the farmer’s knowledge of signs of heat and the length of time the respondents raised livestock and also supported by the value of service per conception in a good research location. Rusdiana & Soeharsono (2018) stated that the calving interval is influenced by many factors including inseminator skills, animal education, calf weaning age, S/C, postpartum marriage, and reproductive status

### 3.5. Birth Weight

Birth weight is an important factor in the growth of the calf. Cattle with large birth weights and born normally will maintain their life better. The birth weight of Bali cattle varies greatly, from observations in Padang Ratu District, Central Lampung Regency, the average birth weight for Bali cattle is 15.40 ± 1.75 kg for males and 15.62 ± 1.73 kg for females. The birth weight of Bali cattle in this sub-district is still within the normal birth range.

The results showed that the birth weight of Bali’s calves in South Poleang District, Bombana Regency was 29.86 ± 5.12 while the number of calves in South Poleang District, Bombana Regency from January to March there were 200 bulls and 168 cows. While Pane (1990) states that the range of birth weights for Bali cattle is 13-18 kg. Childbirth weight is determined by the parent nation, child sex, length of gestation, age or parity of the mother, and diet of the mother during pregnancy (Sultan, 1988).

Birth weight between male and female calves varies greatly. Ax et al. (2016) also stated that the birth weight of male calves was heavier (16.6 ± 2.4 kg) than female calves (15.2 ± 2.7 kg). Furthermore, it was reported that calf body weight was also affected by place. This study also reported that in the highlands, male and female calves showed heavier body weights compared to calves raised by their mothers in the lowlands. Regardless of the sex of the calf, an addition that the birth weight of Bali cattle differs depending on the region.

### D. Conclusion

Based on the results of the study, it can be concluded that the implementation of Artificial Insemination in the Upsus Siwab Program in Bombana District can be said to be successful. This can be seen from the average age of first AI (4.14 ± 0.9) service per conception or the number of inseminations per pregnancy obtained 1-2 times with an average (1.52 ± 0.5), calving interval or spacing of 12 months, duration of pregnancy for 9 months with an average (8.95 ± 0.24) and birth weight obtained 25-40 kg with an average (29.86 ± 5.14) with the number of calves from the January period -March there were 200 bulls and 168 cows.
E. References


