Semen characteristics of Simmental and Limousine bulls raised under station conditions in Lombok, West Nusa Tenggara Province

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Introduction

The artificial insemination (A.I.) programme was introduced to Lombok istand, West Nusa Tenggara Province since 1976. It is mainly based on the use of imported exotic and local bulls semen and using them to crossbreed and upgrade local cattle. The A.I. programme depends on frozen semen which is supplied by A.I. Centres either in Lembang (West Java) or Singosari (East Java). During an autonomy era, some exotic bulls have been imported from Australia to Indonesia by central government, and five of them (three Simmental and two Limousine breeds) were introduced to A.I. Sub-centre in Banyumulek, West Lombok Regency, West Nusa Tenggara Province in the end of December 2003. The purposes of introducing these breeds are to improve and upgrade native (Bali) cattle. These two breeds are now becoming popular to the fanners and found commonly in the villages all over Lombok island.

Selection of the butls by assessing their semen characteristics before recruiting them into A.I. Sub-centre is important. Semen of high quality is required for use in A.I. to maintain satisfactory conception rates in both dairy and beef herd. According to Zemjanis (1970), ejaculates characteristics should be evaluated with regard to volume, colour, concentration, motility, presence and absence of foreign material, live-dead counts and abnormalities. It has been indicated that the semen characteristics of *Bos taurus* and *Bos* indicus breeds were extensively studied under varying environmental conditions (Kodagali, 1967; Raja and Rao 1983; Rao and Rao 1975; Rekwot *et al.* 1987). Due to the fact that no information is available regarding to semen characteristics of Simmental and Limousine breeds raised under hot climate conditions in Lombok, studies on those aspects from the two breeds are of great value.

Thus, the present study was undertaken to investigate the characteristics of Simmental and Limousine bulls semen, with the objective to determine their suitability and effectiveness for using in A.I. programme.

Materials and Methods

This experiment was conducted in Artificial Insemination Sub-centre, Banyumulek, West Lombok Regency, West Nusa Tenggara Province that belongs to West Nusa Tenggara Provincial Livestock Services during a periods of April through December 2004. Three Simmental and two Limousine bulls (*Bos taurus*) around 2 years old were used in this study. These bulls were imported from Australia in the end of December 2003 under Breeding Project Scheme of the Directorate General of Livestock Production, Department of Agriculture, Republic of Indonesia. Each animal housed in individual pen (3 x 6 m) connected with open yard for exercise. All pens were adjacent to semen collection area. Management system of raising the animals in the location was conducted intensively. Improved forages, Elephant grass, was directly provided in the pens (cut and carry systems). Each bull was also received 3 kg per day commercial concentrate. Animals received their requirements according to their body weight and stage of growth. Drinking water

was provided in the pen *ad libitum*. The animals were maintained in good health throughout the experimental period.

Semen was collected using a srandard artificial vagina (40 - 45°C) from five mature bulls which consists of three Simmental and two Limousine bulls. Semen collection was made twice a week (Monday and Thursday) from 08:00 to 10:00 am. The bull was teased before each collection by walking him behind a teaser bull allowing 2 to 3 false mounts during a period up to 5 minutes. Ejaculate collected in the collection *tube* was immediately brought into *the* laboratory and put in the waterbath (30°C) for semen characteristics assessments.

Each ecautate was evaluated as described by Zemjanis (1970). This included visual or gross evaluation of the ejaculate soon after collection in respect of volume, colour, and presence or absence of foreign material, and microscopic examination of individual sperm motility. it was determined by examining a drop of raw undiluted semen on prewarmed slide at 37°C with cover slip under phase contrast microscope at 400X magnification. Semen concentration was determined by the use of digital photometer (MINITUBE-Germany). The hydrogen ion concentration (pH) of the semen was determined by the pH indicator paper.

Subjective motility assessment was determined in Semen Laboratory of A.I. Sub-centre, Banyumulek. Data on different characteristics of semen (volume, motility, concentration of spermatozoa per ml and total concentration of spermatozoa per ejaculate) were statistically analyzed using ANOVA procedure after angular and square root transformation.

Results and Discussion

In general, the study shows that effect of bulls on semen characteristics (volume, motility, concentration of spermatozoa per ml and total concentration of spermatozoa per ejaculate) was found to be highly significant ($p<0.001$).

The majority of semen samples showing milky white colour. The consistency of the ejaculates ranged from thin to thick. Kodagali (1967) observed that the colour of the normal ejaculates from Gir and Jafri breeds ranges from milky to creamy. Kodagali (1967) also stated thar semen of healthy bulls is milky white or yellowish mitky in colour. The consistency is either thin or thick, depending on the concentration of sperm. In general, the thicker semen samples had higher concentration and the thinner ones had lower concentrationof sperm (Rekwot *et al.* (1987).

All semen samples from five bulls indicating an average initial pH reading of 6.2. The average pH of *Bos indicus* and *Bos taurus* bull semen has been found to be 6.79 (Rao and Rao, 1975).

In the present study, no significant different in semen volume among Jayengrana, Umarmaya, and Tamtanus bulls was observed. The difference in semen volume between Jayengrana, Umarmaya and Banjaransari bulls was also non significant. This is similar to the observation of Raja and Rao (1983), who found no significant difference in the ejaculate volume between Brown Swiss crss-bred bulls. However, semen volume of Banjaransari bull was significantly higher ($p<0.001$) than semen volume of Tamtanus and Umarmadi bulls.

The highest average of semen volume was found in Banjaransari bull (7.86 ± 0.57 ml), followed by Jayengrana (6.11 ± 0.88 ml), then Umarmaya and Tamtanus bull (5.84 ± 0.38 ml and 5.57 ± 0.30 ml); whilst the lowest average of semen volume was recorded *in* Umarmadi bull (4.00 ± 0.35 ml). The value recorded in the present study for Umarmadi *is* similar to the value reported by Rao and Rao (1975) in Jersey bull. This, however, is higher than *the* value reported by Raja and Rao (1983), who found the volume of semen per ejaculate to be 2.65 ± 0.084 ml for the cross-bred Brown Swiss bulls, the variation in this regard probably being attributable to differences in the ages of the animals used I the present study.

There was no significant difference in the average of sperm motility among Jayengrana, Tamtanus, Umarmadi, and Banjaransari bulls. However, sperm motility in Jayengrana, Tamtanus, Umarmadi, and Banjaransari were statistically ($p<0.001$) higher compared with Umarmaya bull. As well as the average of sperm motility in Umarmadi was found to be significantly ($p<0.001$) higher than that of Umarmaya bull. The average of sperm motility in Jayengrana, Tamtanus and Banjaransari bulls were 68.33 ± 1.18, 66.67 ± 2.50 and 68.75 ± 1.25 percent, respectively. The present findings are closely to earlier observation by Raja and Rao (1983), who noted the average of motility of sperms to be 66.24 ± 0.874 in Brown Swiss cross-bred bulls. In the present study, Umarmadi bull shows the average motility of 57.78 ± 7.95 percent and the lowest average sperm motility is observed in Umarmaya bull, that is 31.25 ± 2.95 percent. Compared with figures presented by Raja and Rao (1983) in Brown Swiss cross-bred bulls, the former figure is found to be slightly lower than that of Umarmadi bull, but in the latter, this much lower than that of Umarmaya bull.

A highly significant ($p<0.001$) difference in the average concentration of sperm atozoa per ml was observed between Jayengrana, Tamtanus and Umarmadi bulls with Umarmaya bull. The average concentration of sperm per ml in five bulls was $2.356 \pm 0.06 \times 10^9$ with ranged of 0.954 – 2.912. This is almost similar with the values reported by Rekwot *et al.* (1987), who found sperm concentration of bulls were $0.970 \pm 0.11 \times 10^9$/ejaculate in dry season and $1.742 \bullet 0.11 \times 10^9$/ml in rainy season. Among the five bulls, the highest average concentration of spermatozoa was recorded in Umarmadi bull (2.628 & 0.07×10^9/ml). It is then followed by Tamtanus ($2.535 \pm 0.04 \times 10^9$/ml), Jayengrana ($2.396 \bullet 0.19 \times 10^9$/ml) and Banjaransari bull ($2.255 \pm 0.09 \times 10^9$/ml). The present study also revealed that the lowest average concentration of spermatozoa was noted in Umarmaya (1.903 0.12×10^9/ml). This is slightly higher than that of average concentration of Brown Swiss cross-bred bulls sperm ($1599.64 \bullet 55.371 \times 10^6$/ml) recorded by Rao and Rao (1983) and Jersey bulls sperm ($1296 \pm 184 \times 10^6$/ml) reported by Rao and Rao (1975).

The average of total concentration of spermatozoa per ejaculate was found to be significantly ($p<0.001$) higher in Banjaransari bull ($18.008 \bullet 1.80 \times 10^9$) than in Umarmaya ($11.085 \pm 0.95 \times 10^9$) and Umarmadi bull ($10.465$ a 0.92×10^9). Jayengrana bull ($15.355 \pm 2.46 \times 10^9$) also showed higher ($p<0.001$) total sperm concentration per ejaculate than Umarmadi bull ($10.465 \pm 0.92 \times 10^9$). In the present study, the average concentration of spermatozoa per total ejaculate in five bulls was $13.764 \pm 0.78 \times 10^9$ with ranged of 1.717 – 28.468. This is slightly higher than values obtained by Rekwot *et al.* (1987), who recorded that total concentration of spermatozoa of bulls were $3.317 \pm 0.21 \times 10^9$/ejaculate in dry season and $10.104 \pm 0.51 \times 10^9$/ejaculate in rainy season.

Conclusion

From the results of this study it is assumed that semen of Jayengrana, Tamtanus, Umarmadi and Banjaransari bulls under the conditions prevailing in the AI Sub-centre, might be suitable for further processed. However, it remains to be seen whether the spermatozoa will maintain their motility after being frozen, so that they can be used in A.I. Programme in Lombok, West Nusa Tenggara Province.

References

Kodagali, S.B. 1967. Studies on semen characteristics in Gir and Jaffri breeds. Indian vet. J. 44:773-776

Raja, C.K.S.V. and Rao, A.R. 1983. Semen cheracteristics of Brown Swiss cross-bred bulls. Indian vet. J. 60:23-28

Rao, R.M. and Rao, A.R. 1975. Studies on semen characteristics of Tharparkar and Jersey bulls. Indian vet. J. 52:889-900

Rekwot, P.I., Vo, A.A., Oyedipe, E.O., Opaluwa, G.I., Sekoni. V.O. and Dawuda, P.M. 1987. Influence of season on characteristics of the ejaculate from bulls in an artificial insemination centre in Nigeria. Anim. Reprod. Sci. 14:187-194

Zemjanis, R. 1970. Collection and evaluation of semen. In: Diagnostic and Thereapeutic Techniques in Animal eproduction, 2'' Edition, Williams and Wilkins Co., Baltimore, MD. Pp. 139-156