EFFECT OF TRADITIONAL HERBAL SUPPLEMENTATION ON PERFORMANCE OF PO BULL

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ABSTRACT

One of the keys to get successful reproduction of cattle is bull fertility. The aim of this research was to study the effect of traditional supplementation on quality of fresh semen. This research was conducted at the Beef Cattle Research Institute cooperated with Medical Plant and Aromatic Research Institute in January – December 2011. In this research 20 bulls of more than 2 years old were used, and divided in to 5 treatments, there were: (1) formula 1 without fermentation; (2) formula 2 without fermentation; (3) formula 1 with fermentation; (4) formula 2 with fermentation and (5) positive control using Kuku Bima. The bull was given supplementation every two days in seven weeks and semen was collected every week. Dose of supplementation was 70 g/kg body weight. The supplementation was given together with 5 eggs and 250 ml of honey. Data was analyzed with general Linear Model (GLM) and the parameters were the quality of semen (motility, concentration and percentage of live sperm), body weight and average daily gain (ADG). Result showed that treatment 4 produced higher quality of semen than the other treatments. It was concluded that formula 2 with fermentation can increase the quality semen of bull.

Key words: Traditional Herbal, Semen Quality, Bull

INTRODUCTION

Bull for natural mating and as semen resources should has a good libido and semen quality, and morphology as well. Some of the problems that often arise in the bulls include: reduction in quality and quantity of semen and low libido. Low quality of semen could affect the reproductive efficiency of cows. This condition required system maintenance of selection, feed supplementation, comfortable stall, health management and proper mating management.

Supplementation in bulls may come from traditional materials that are easily available and could increase libido and semen quality. These materials include *Boesenbergia pandurata*, the group of zingebereceae that useful as a variety of drugs. It contains essential oils (borneol, camphor, sineol, ethylalcohol), starch, saponins and flavonoids. Normally, it is used as a drug to increase blood circulation and stamina. In addition, it also contains pinostrobin and pinocembrin as anti-cancer, anti-oxidants agents (Ratnawati *et al.*, 2008).

Medicinal plants are widely used as an alternative medicine such as ginger, turmeric, noni, meniran, and *Andrographis paniculata* Ness. Of the nine content of bitter compounds, isolates of the chemicals andrografolida is the most important and widely studied (Astuti *et al.*, 2008). In general, the active substance contained in the bitter andrografolida provides immunostimulating and antibacterial effects (Bone, 2001; Puri *et al.*, 1993) and from clinical trials it is effective anti malarial parasites (Hadisahputra *et al.*, 2005). Some research using medicinal plant extracts proven to alter the activity of the immune system through cytokine regulation (Spelman *et al.*, 2006). Extracts of ginger, turmeric, ginger, galangal able to increase the activity of the immune system and also serves as aphrosidiaka in experimental animals (Chang *et al.*, 1995; Spelman *et al.*, 2006).

Traditional supplements can be given directly or through a specific process, such as fermentation. Fermentation is the process of energy production in cells in an anaerobic (without oxygen). In general, fermentation is a form of anaerobic respiration, however, there is a clearer definition which defines fermentation as respiration in an anaerobic environment with no external electron acceptor. (Wikipedia, 2012). Fermentation products contain chemical

energy that is not fully oxidized but not further metabolized without oxygen or other electron acceptors (the more highly-oxidized) so it tends to be considered waste products (waste). A consequence is that the production of ATP from the fermentation is less efficient than oxidative phosphorylation, in which piruvat is fully oxidized to carbon dioxide. Fermentation produces two ATP molecules per molecule of glucose compared with 36 ATP produced from aerobic respiration.

MATERIALS DAN METHODS

The study was conducted in January – December of 2011 at the Beef Cattle Research station in collaboration with the Research Institute for Medicinal and Aromatic Plants (Balitro). The study used 20 bulls above the age of 2 years. Research including the following stages: preparation and delivery of medicinal herbs to the bull.

Preparation of herbal medicine

Herbal raw materials prepared by Balitro (Bogor) in powder form. There were four formulas, each consisted of component-zingiberaceae (temulawak, temu ireng, galangal), pasak bumi, purwoceng, chili Java, tribulus and Kebar Grass. Two formulas without fermentation process (formulas 1 and 2) and two other formulas were fermented using EM4 (formulas 3 and 4). Using a randomized block design with four replications. The formulation combines herbs with medicinal raw materials with a specific dose, then added fermentor (Formula 3 and 4) and honey, then stored for 7 days. Composition of the herbal formulas is shows in Table 1.

Delivery the formula to bull

Males were given herbs once every two days for 7 weeks. Collecting semen was done once a week. Medicinal doses were 10 g/day/cow. Additional feed to male was 5 eggs and 250 ml honey. Analysis of semen quality was done before given formula as control data. As positive control, bull was given kuku bima supplement with a dose of 70 kg BW/1 package. Observations of feeding and average daily gain (ADG) during the study period were conducted. After the semen collected, it was followed by a macroscopic evaluation of fresh semen (mass movements, individual movements/motility and live sperm). Semen analysis procedures were performed in accordance with the method Toliehere (1993). Judging of mass movement in 3 categories: (+) slow motion; (+ +) quick movement are not cloudy; (+ + +) fast motion, like a cloud. The calculation of the concentration calculated using the room neurbauer by theformula: Number of sperm in 5 square × 400 × 50,000 × % of live sperm. Data analysis using general linear model (GLM).

The quality of bull semen on ejaculation herbal formula I after being administered for 7 weeks are listed in the table below.

Table 2 shows that the administration of herbal influence ($P < 0.05$) to the quality of sperm produced in one ejaculation. The highest sperm motility (57.96%) in the formula IV

Tabel 1. Composition of herbal formula

Raw materials	Formula without fermentation		Formula with fermentation	
	F1 (%)	F2 (%)	F3 (%)	F4 (%)
Temulawak	15	15	15	15
Temu ireng	10	10	10	10
Lengkuas	20	20	20	20
Sambiloto	10	10	10	10
Cabe Jawa	25	25	25	25
Pasak bumi	20	15	20	15
Purwoceng	0	5	0	5
Total	100	100	100	100

Table 2. The average quality of bull semen in the ejaculate after administration of herbal medicine I

Parameter of semen quality	Formula				
	I	II	III	IV	V
Sperm motility (%)	31.43[a]	31.89[a]	32.50[a]	57.96[b]	31.07[a]
Concentration (million/cc)	532.14[a]	732.14[ab]	474.29[a]	1120.00[b]	551.43[a]
Live sperm (%)	37.71[a]	37.71[a]	42.43[ab]	64.11[b]	37.96[a]

are significantly different with formula I, II, III and V. Likewise, sperm concentration, the treatment IV is higher (1120 million/cc) than the formula I, III, and V. The highest percentage of live sperm percentage in formula IV (64.11%), which is significantly different with formula I, II and V.

In Table 3 show that the administration of herbal influence ($P < 0.05$) to the quality of sperm produced in the second ejaculate. The highest sperm motility (64.64%) in the formula IV are significantly different with formula I, II, III and V. Likewise, sperm concentration, the treatment IV was markedly higher (1239.29 million/cc) than the formula I, III and V. The highest percentage of live sperm in formula IV (70.07%) was significantly different with formula I, II, III, and V.

RESULTS AND DISCUSSION

Sperm motility

Sperm motility defined as the number of motile sperm of spermatozoa alive and moving progressive whose value ranges between 0 – 100% (ISO, 2005). Evaluation of post-thawing motility of spermatozoa is one of the many parameters used to determine the quality of bovine semen to be used for artificial insemination. Minimum requirements of individual motility post thawing in order to semen can be used in artificial insemination is 40% (Garner and Hafez, 1993). Susilawati, Srianto, Herman and Yuliani (2003) states fertilization process takes about ten million spermatozoa motile spermatozoa, the spermatozoa as a standard requirement is 2.5×10^7 inseminated spermatozoa per straw with 40% motility.

At ejaculation I and II obtained the percentage motility of formula IV was the best; 57.96 and 64.64%. Motility values (ejaculation I and II) was still in line with the results of Garner and Hafez (1993) which states that the motility of semen ranged between 40 – 75%. In general, mature bulls % (> I1) have the ability to ejaculate up to 6 times and can maintain the quality of his sperm until to the ejaculate 5. The decrease of sperm motility in premature ejaculation I to II was not more than 1% (Wijono, 1999). Formula IV was a herbal formula with fermentation process treatment. Percentage of sperm motility was different in each individual cow, this is presumably due to differences in the availability of energy resources in the form of fructose, glycerylphosporilcholine (GPC) and sorbitol which causes a higher motility of spermatozoa (Susilawati *et al.*, 1993).

Sperm concentration

Sperm concentration is the number of spermatozoa contained in 1 ml of semen, usually expressed in number of million/ml.

Table 3. The average quality of bull semen in the ejaculate after administration of herbal medicine II

Parameter of semen quality	Formula				
	I	II	III	IV	V
Sperm motility (%)	35.36[a]	38.75[a]	25.71[a]	64.64[b]	36.07[a]
Concentration (million/cc)	692.86[a]	875.71[ab]	413.57[a]	1239.29[b]	594.29[a]
Live sperm (%)	37.61[a]	40.36[a]	27.32[a]	70.07[b]	38.21[a]

Sperm concentration in cows affected by the age factor. With the increasing age of the male sperm concentration decreased due to decline in organ function in the process of spermatogenesis. However, before the age of 22 months, bulls showed an increase in sperm concentration (Mathevon *et al.*, 1998). There is another notion that genetic factors also influence the concentration of sperm (Situmorang, 2002).

At ejaculation I and II obtained the result that the concentration of bovine sperm in treatment IV (fermented herbs) showed the best results, 1120.00 million/ml and 1239.29 million/ml. Based on the results of research Wijono (1999) showed that increasing the concentration of sperm in adult bulls (I1) in the ejaculate I to II reached 8.6%. Sperm concentration values were almost the same as the concentration of the Charolais cow once a week at 200 – 1200 million spermatozoa/ml during the first 12 weeks after reaching puberty (Lunstra and Echternkamp, 1982). According to Hafez (1980), concentration of spermatozoa is influenced by various factors, breed, age and frequency of ejaculation.

Herbal ingredients fermentation

Herbal ingredients used in this study include: zingiberaceae (temu lawak, temu ireng, galangal), pasak bumi, purwoceng, chili Java and sambiloto. The active substance of temu lawak was in the form of curcumin. Tongkat ali contains four important compounds; canthin, eurycomanone derived compounds, quassinoid compound, and ethanol. Ethanol is the component that serves as aphrodisiac. Other active ingredients contained in pasak bumi was beta-sitosterol, N-nonacosana, and neoclovena; that improve testosterone levels in adult men and accelerate blood circulation, including the direction of male genitalia (Anonymous, 2011). Purwoceng, a commercial herb medicinal roots was reported as an aphrodisiac (increases sexual desire and causes an erection), diuretics (urine channel launched), and tonic (able to increase the stamina of the body). Compounds in purwoceng were furanokumarin group (bergapten, isobergapten, and sphondin), saponins, sterols, alkaloids, and several kinds of sugars (oligosaccharides) (Darwati and Diversity, 2006). Java chilli are known to have a stimulant effect on nerve cells so as to increase stamina. Hormonal effects of this plant is known as aphrodisiac. Based on scientific research, chili Java is used as aphrodisiac because it has androgenic effects, for anabolic steroids, and antiviral. From a review of the literature it is said that in general the chemical or chemical compound that acts as aphrodisiac are derivatives of steroids, saponins, alkaloids, tannins and other compounds that can improve blood circulation (Moeloek *et al.*, 2010). Sambiloto contains of flavonoids, and lactones. In the lactone, the main component is andrographolide, which is also the main active ingredient of this plant (Widyawati, 2007).

Mainly, the working mechanism of the drug mixture is a combination of each component material. General functions of these ingredients is increasing blood flow, including the circulation in the genital organs. It is also has androgenic properties, which stimulates the production of androgen hormones in the body of the bull. Sambiloto and Pasak bumi are the herbal remedy that has the nature of the synergism, which is more androgenic nature when given together. The fermentation process was carried out aimed to improve the effectiveness of the active substances contained in the herbal formula.

Bull performance

During this research, monitoring the performance of bulls, such as: body weight and daily body weight gain (ADG) was also done.

Initial body weight of the bulls on all treatments herbal formula was the same or not significantly different ($P > 0.05$). Similarly, all ADG was the same herbal treatment with 95% confidence rate.

CONCLUSION

Formula IV, the formula with a medicinal ingredient previously fermented significantly improved the quality of bull semen, including motility parameters, concentration and percentage of live sperm.

Table 4. Average initial body weight and daily body gain of bull

Parameter	Formula				
	I	II	III	IV	V
Body weight of bull (kg)	452.00	484.00	300.50	461.50	453.25
ADG (kg/day)	0.61	0.42	0.47	0.18	0.46

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