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Nutrition In-Utero Administration in Pregnant Bali Cows; its Effect on Metabolite Status

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Abstract. The aim of this study was to know the effect of nutrition in-utero administration on metabolite status in pregnant Bali cows. A total of 90 Bali cows were clinically examined in the present study for pregnancy status. Out of 90 cows, 33 cows were pregnant at various age of pregnancy. The remaining 57 cows did not become pregnant at the time of clinical examination. All cows were treated with nutrition in-utero. Blood urea nitrogen (BUN), creatinine, and glucose concentrations were measured before and during treatment. The results of this study showed that concentrations of BUN, creatinine, and glucose before treatment (mean±SD) were 12.1±4.5 mg/dL, 1.7±0.4 mg/dL, and 56.1±23.4 mg/dL, respectively. After treating the cows, the concentrations of BUN, creatinine, and glucose were relatively similar to the concentrations before treatment; 11.7±5.5 mg/dL, 1.6±0.2 mg/dL, and 50.9±8.4 mg/dL, respectively. Likewise, non-pregnant cows that showed normal ovarian activity, the concentrations of BUN, creatinine, and glucose were also relatively similar both before and after treatment (14.2±7.6 mg/dL vs 11.8±2.7 mg/dL; 1.3±0.1 mg/dL vs 1.6±0.2 mg/dL; and 46.9±9.2 mg/dL vs 56.6±20.5 mg/dL). It is noteworthy that in anestrus cows, the concentration of glucose before treatment was only 28.7±15.0 mg/dL and it was increased to 53.0±7.1 mg/dL after treatment, while concentrations of BUN and creatinine were relatively similar both before and after treatment (12.9±0.8 mg/dL vs 8.4±0.2 mg/dL and 1.0±0.2 mg/dL vs 1.6±0.1 mg/dL). In conclusion, Bali cows with normal concentrations of BUN, creatinine, and glucose during pregnancy tended to maintain their metabolite status. Administration of nutrition in-utero in anestrus cows improved glucose concentration.

Keywords: bali cows, metabolite status, nutrition in-utero, pregnancy, anestrus.

1. Introduction

Pregnancy consists of a series of small, continuous physiologic adjustments that affect the metabolism of all nutrients [1] Moreover, although pregnancy is a continuum of small physiologic adjustments, the changes are often grouped by period of gestation, ie, the first and last halves, the 3 trimesters, or the 4 quarters of pregnancy. These adjustments in nutrient metabolism are complex and evolve continuously throughout pregnancy. Therefore, major adaptations in maternal physiology and metabolism are required for successful pregnancy [2].

As gestation progresses, reference ranges from for the concentration of many biochemical parameters change significantly from those found in the non-pregnant state [2], [3], including metabolite status. As a dynamic and anabolic state, pregnancy within several weeks, a new endocrine organ, the placenta is already formed and is secreting hormones that affect the metabolism of all nutrients [1]. In this mechanism, lacking of certain nutrient; for example in cow's diet is hypothesized to have changes in metabolite state and

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subsequently affecting the pattern of fetal growth. Therefore, the aim of this study was to know the effect of nutrition in-utero administration on metabolite status in pregnant Bali cows.

2. Materials and Methods

2.1. Animals and management

A total of 90 Bali cows in smallholder farms were used in this study. The cows were mainly raised by the farmers concurrently with all their cattle in the same management. Likewise, the cows were managed without any different treatment including nutritional requirements during pre-calving, postpartum, lactating and pregnant, and gestation. The animals were sent out to the field at the day-time and housed at the nigh-time. Feedstuffs consisted of grass and rice straw; sometimes they were fed rice bran without any concentrate and mineral supplements [4].

All cows were clinically examined for pregnancy status. The cows that did not become pregnant at the time of clinical examination, they were then examined for reproductive physiological status. All cows were treated with nutrition in-utero for four months. Nutrition in-utero was made as UMMB-like with nutrient composition is shown in Table 1.

Table 1. Nutrient composition of "Nutrition in Utero" and feedstuff that used in the study

Content	Composition (%)	
	Nutrition in Utero (UMMB-like)	Feedstuff
Water	26.43	70.12
Crude protein	31.23	6.15
Crude fat	25.22	6.35
Crude fiber	9.33	31.46
Nitrogen free extract	10.01	41.06
Ash	24.21	14.49
Calcium	2.67	0.70
Phosphor	1.09	0.40

2.2. Reproductive management

Under smallholder raising cattle, the farmers have no special management for reproduction including recording, estrous induction/synchronization, heat detection aid. However, mainly farmers could recognize the animal in estrus, especially standing estrus. When the animal showing estrus, the farmers are usually inform to the inseminator for artificial insemination (AI) or natural mating by bull if available or seek by request to the neighbour bull for mating.

2.3. Blood collection

Blood samples were collected two times; before and after treating with nutrition in-utero from all cows in the morning between 08:30 and 10:00 am via jugularis vein into evacuated vacuum tubes containing K_3-EDTA. After collection, a drop of sample were taken for glucose test using Easy Touch® GCU, then the samples were kept at 4℃ and were centrifuged within 4 h at 1500 x *g* for 15 min to collect plasma. The plasma was then stored frozen at -20℃ until analyzed for blood urea nitrogen (BUN) and creatinine [4].

2.4. Data analysis

Data were tabulated and statistically analyze using Microsoft Excel, 2007. All data were presented as mean ± standard deviation (SD). These parameters were compared using analysis of variance (ANOVA).

3. Results and Discussion

Out of 90 cows that clinically examined in the present study, 33 cows were pregnant at various age of pregnancy. The remaining 57 cows did not become pregnant with various reproductive physiologies such as active and inactive ovaries at the time of clinical examination. Before treating with nutrition in-utero, concentrations of BUN, creatinine, and glucose in pregnant Bali cows (mean±SD) were 12.1±4.5 mg/dL, 1.7±0.4 mg/dL, and 56.1±23.4 mg/dL, respectively. After treating the cows, the concentrations of BUN, creatinine, and glucose were relatively similar to the concentrations before treatment; 11.7±5.5 mg/dL, 1.6±0.2 mg/dL, and 50.9±8.4 mg/dL, respectively (Tabel 2).

Table 2. Concentration of blood urea nitrogen (BUN), creatinine and glucose in pregnant Bali cows before and after treating with nutrition in utero

	Concentration (mg/dL)		
	BUN	Creatinine	Glucose
Before treatment			
Mean	12.1	1.7	56.1
Standard deviation	4.5	0.4	23.4
Minimum	6.5	1.1	20.0
Maximum	20.3	2.6	118.0
Before treatment			
Mean	11.7	1.6	50.9
Standard deviation	5.5	0.2	8.4
Minimum	5.0	1.2	37.0
Maxi mum	27.2	2.2	67.0

Non-pregnant cows that showed normal ovarian activity, the concentration of BUN was slightly decreased (14.2±7.6 mg/dL vs 11.8±2.7 mg/dL) (Fig. 1), however, the concentrations of creatinine, and glucose were increased (1.3±0.1 mg/dL vs 1.6±0.2 mg/dL; and 46.9±9.2 mg/dL vs 56.6±20.5 mg/dL) (Fig. 2 and 3). It is noteworthy that in anestrus cows, the concentration of glucose before treatment was only 28.7±15.0 mg/dL and it was increased significantly to 53.0±7.1 mg/dL (Figure 3) after treatment, while concentrations of BUN and creatinine were relatively similar both before and after treatment (12.9±0.8 mg/dL vs 8.4±0.2 mg/dL and 1.0±0.2 mg/dL vs 1.6±0.1 mg/dL) (Fig. 1 and 2).

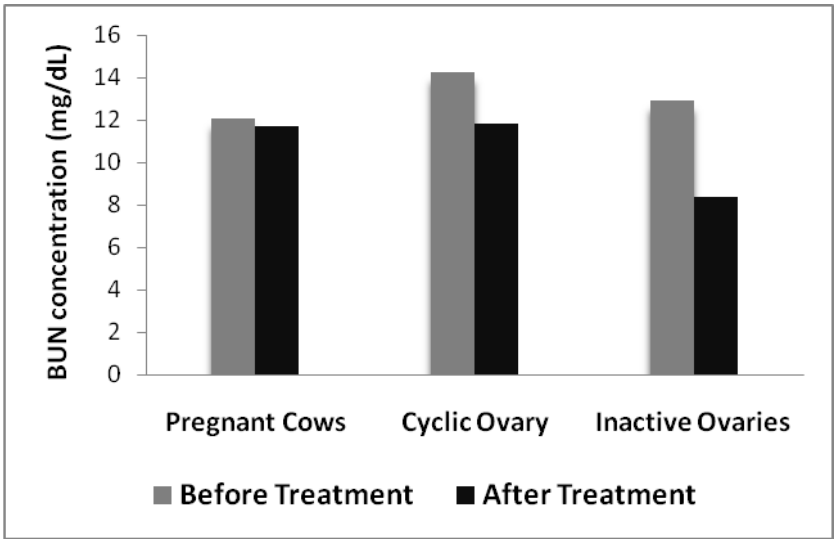

Fig. 1: Changes in BUN concentration of pregnant, cyclic ovary and inactive ovaries in Bali cows before and after treating with nutrition in utero

Evaluation of blood biochemical provides an opportunity to expect the healthy production in animals [5]. Likewise, this evaluation is also valid for cows at different reproductive physiological state. In pregnant cows, this evaluation is useful in expecting the healthiness of fetal growth. For example, glucose is a primary

nutrient for conceptus growth and milk synthesis [6]. Moreover, they stated that glucose is the most important source of fuel for oxidation in fetal and placental tissues. While in non-pregnant cows, this evaluation would able to describe the ovarian function especially in anestrous cows. Low concentration of glucose in postpartum cows tended to increase the interval between calving and resumption of ovarian cycle. It is noteworthy that anestrous cows in the present study were likely to have ovarian activity after treating with nutrition in-utero. This may due to that the level of both energy and protein as well as minerals content in the diet improved the reproductive state of the animals. Therefore, it is necessary to evaluate the animals in any state of reproductive physiology for their metabolite state in relation to their diet and production.

In conclusion, Bali cows with normal concentrations of BUN, creatinine, and glucose during pregnancy tended to maintain their metabolite status. Administration of nutrition in-utero in anestrous cows improved glucose concentration and improved ovarian function.

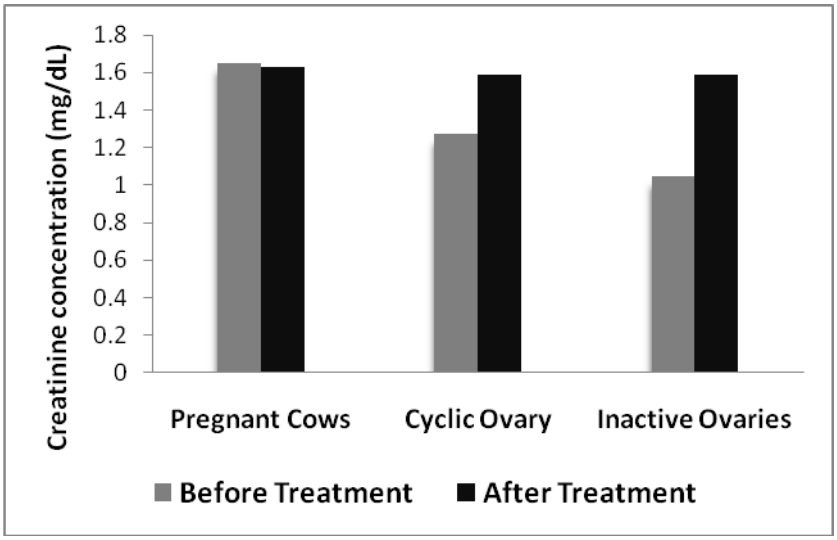

Fig. 2: Changes in creatinine concentration of pregnant, cyclic ovary and inactive ovaries in Bali cows before and after treating with nutrition in utero

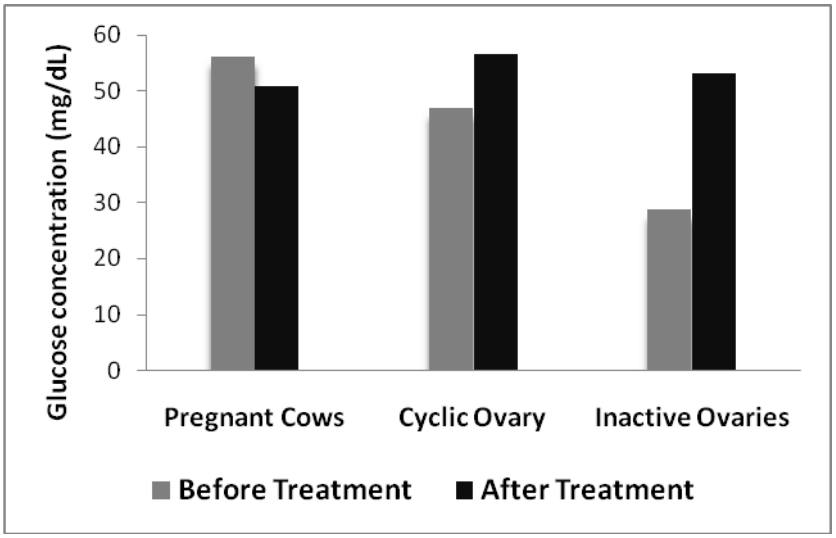

Fig. 3: Changes in glucose concentration of pregnant, cyclic ovary and inactive ovaries in Bali cows before and after treating with nutrition in utero

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