HIGH BLOOD / MILK UREA NITROGEN HAD DELETERIOUS IMPACT ON FERTILITY PARAMETERS IN CROSSBRED COWS

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ABSTRACT

Eighty-two healthy and recently calved crossbred cows from seven dairy farms were subjected to monthly blood and milk sampling for a four-month period for blood and milk urea nitrogen (BUN/MUN) assessment. The fertility parameters like calving to first estrus interval, calving to first service interval, calving to conception interval, services per pregnancy and percent animal conceived were recorded. The cows with high BUN or MUN had similar number of days to exhibit estrus and to first service compared to their counterparts ($p>0.05$). The cows with low BUN or MUN had lesser number of days to conceive than those with high BUN ($p<0.05$) or MUN ($p>0.05$). The percent animals conceived followed a similar trend in both BUN and MUN groups; low level groups had higher ($p<0.05$) conception rates. The number of services per conception was less among cows having low BUN or MUN. In brief, high BUN/MUN have deleterious effects on fertility of lactating crossbred cows.

Keywords: BUN, Crossbred cows, Fertility, MUN, Protein

An improvement in milk production in a crossbred cow warrants feeding strategies like feeding of high protein diet, however, this leads to an increase in blood (BUN) or milk (MUN) urea nitrogen. The monitoring of BUN or MUN is a reliable technique that can be used for measuring protein status of cattle. However, it is not known how the levels of urea in circulation, consequent upon feeding of protein rich diet would affect the reproductive efficiency of crossbred cows.

Recently calved apparently healthy crossbred cows (n=82) were selected from seven organized private dairy farms. Each animal was subjected to four blood and milk samplings on a particular date of each month starting from first month of their calving (first sample taken within 5-30 day after calving). Both blood and milk samples were analyzed for Blood Urea Nitrogen (BUN) and Milk Urea Nitrogen (MUN), respectively using commercial kits (BUN - Ortho-Clinical Diagnostics India Pvt. Ltd., Thane; MUN - Bayer Diagnostics, India) under recommended protocols. To calculate BUN and MUN of individual postpartum animals; Firstly, mean BUN/MUN values of all 4 months was calculated for each individual animal and then their overall means were calculated for all animals. The animals with values above and equal to mean BUN (15.03 mg/dl) and MUN (13.07 mg/dl) were considered under high BUN/MUN groups and the others with values below mean BUN/MUN were considered under low BUN/MUN groups.

The fertility parameters of each cow like calving to first estrus interval, calving to first service interval, calving to conception interval, service per conception and percent animal conceived were recorded from the respective farms. The data were analyzed statistically using SAS 9.2 software. Significance level of percentage animals conceived between the groups was calculated using CHI Square Test. Significance level of fertility parameters was calculated using Unpaired T Test.

The cows with high BUN or MUN had similar number of days to exhibit estrus and to first service post calving as their counterparts with low BUN or

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Table 1: The comparison of fertility parameters between High BUN / MUN or Low BUN / MUN exhibiting crossbred cows.

Parameter(s)	Blood urea nitrogen (BUN)		Milk urea nitrogen (MUN)	
	High BUN, >15.3 mg/dl, n=46	**Low BUN, <15.3 mg/dl, n=36**	**High MUN, >13.1 mg/dl, n=37**	**Low MUN, <13.1 mg/dl, n=45**
Calving-1st estrous interval, d	89.5±1.9	84.4±2.4	89.1±2.4	85.3±1.9
Calving-1st service interval, d	93.9±2.2	90.7±2.6	93.2±2.8	91.8±2.0
Calving-conception interval, d	121.6±5.6	104.0±4.7*	113.0±4.2	108.6±8.4
% conceived	45.6	75.0*	32.4	80*
Services/conception	2.1±0.1	1.7±0.1	2.1±0.1	1.8±0.1

*p<0.05; between groups for BUN or MUN

MUN (p>0.05, Table 1). Similarly, high BUN (Harris, 1992) or MUN (Larson *et al.,* 1997) had no impact on days to first estrus and days to first service intervals. Others observed that cows with low MUN (<10 mg/dl) presented longer intervals between calving to first estrous and calving to first service with justification that animals fed with low protein resulted in delayed post-partum ovarian activity (Carlsson and Pehson, 1993). Furthermore, cows with high MUN also exhibited significant extension in calving to first estrous interval (Veena *et al*., 2016).

The cows with low BUN or MUN took lesser number of days to conceive than those with high BUN (p<0.05) or MUN (p>0.05, Table 1) as reprted earlier (Rajala-Schultz *et al.,* 2001). The percent cows conceived followed a similar trend in both BUN and MUN groups, and low-level groups had higher (p<0.05) conception rates (Table 1), as reported earlier (Tshuma *et al*., 2014).

The logic for lower fertility in cows having high BUN has been attributed to uterine pH, which decreased approximately by 0.1 pH units for each 5 mg/100 ml increase in BUN. These changes might have affected the uterine environment, which in turn retarded the embryo development and hence, influenced conception adversely. Alternatively, the reason behind negative association between high BUN and reproductive performance could be due to the concurrent energy deficit in such animals (Gulinski *et al.,* 2016). Most of studies pointed out that BUN/MUN at >19 mg/dl and <7 mg/dl could be detrimental to fertility. Since the cut off level in the present study was 15.5 mg/dl for BUN and 13.07 mg/dl for MUN, therefore, it could be inferred that fertility was not affected to that extent as at the cut-off level of 19 mg/dl.

To conclude, high BUN/MUN could have deleterious effects on fertility of lactating crossbred cows. Therefore, the periodic screening for BUN/MUN during postpartum period should be encouraged that would provide early insights regarding proactive dietary protein adjustments for achieving optimum reproductive efficiency.

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