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EFFECT OF CONCENTRATE SUPPLEMENTATION ON AGE AT MATURITY IN GROWING BUFFALO HEIFERS

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ABSTRACT

Poor reproductive performance is serious limitation in exploiting the potential of buffaloes in Pakistan. Buffaloes are commonly fed poor quality forages resulting in late maturity thereby causing economical loss to the farmers. Present study was planned to observe the effect of concentrate supplementation on age of puberty of growing buffalo heifers. Eighteen Nili Ravi buffalo heifers (12±2 months old), weighing 170±8 kg were divided into two equal groups "A" and "B". Animals in group "A" received forage alone, available in the season, and served as control. Group "B" was supplemented with a concentrate @1 kg per animal per day for first six months and then 1.5 kg per animal per day till the end of experiment along with the forage. The experiment lasted till puberty was observed in both the groups. Data regarding onset of puberty was taken by observing estrous symptoms and further confirmed through rectal palpation. A significant effect of the concentrate supplementation was noted on age at puberty. Heifers in group "A" reached to the puberty at 35.8 ±1.5 months while animals in group "B" attained the same stage at 23±0.25 months. Type of feeding strategy showed significant effect ($P \leq 0.01$) on age at puberty and resulted in a decrease of 55.5% in the time required to enable the animals to breed. It appears from the results of this study that farmers could save tremendous time and resources by feeding concentrate to young growing stock for better animal production.

Key words: Concentrate, supplementation, puberty, buffalo, forage.

INTRODUCTION

The buffalo, (*Bubalus bubalis*) is the world `s most neglected domestic animal and the one with the greatest unexploited potential. The world buffalo stock number is approximately 150 millions at present. They are originally Asian animals and have been classified into swamp and river buffaloes based on their karyotype. The swamp buffaloes are raised in countries extending from Assam to China and used for drought power and river are found in the Indian sub-continent, and used primarily as a source of milk, (Cockril, 1974 and 1977).

The fertility of buffaloes was significantly higher (83.5%) when kept on higher plan of nutrition as compared to 66.6% for those maintained on low plan of nutrition, (Poy and Panda, 1971). Balanced feeding, improved management and minimum disease prevalence can be helpful in reducing the age of first calving (Heinrichs *et al*. 2005). Bhatti *et al*. (2007) stated that in our system, forge should be the main feed supplemented with concentrate and suggested other performance modifiers to gain faster growth rate for early puberty on cost effective basis. Buffaloes are suitable for breeding at about 24 months of age. But in the majority of dairy buffaloes calving occurs at 4-6 years of age. This is due to an inadequate supply of feed and nutrients during the growing phase (Ingawale and Dhoble, 2004). The available feed ingredients for livestock in tropical and subtropical countries including Pakistan are low in crude protein (CP) and lipids whereas high in crude fiber (Ludri and Razdan, 1980), which adversely affects the onset of puberty independent of growth rate. Nanda *et al*. (2003) reported that most buffalo cease ovarian cyclicity during hot summers probably due to the combined effects of nutrition, environment and management. Nutritional manipulations may influence the period of sexual maturation (Schoppee, *et al*. 1996).

In Pakistan, buffalo is an important animal; its population is about 20.2 million and is increasing at the rate of 5% annually. It contributes about 75% of total national milk production and more than 50 % beef production in the country. Low reproductive efficiency (late maturity, long calving interval and silent heat etc.) is a serious constraint to buffalo production, (Mahadevan, 1978). To solve this problem the present study was planed to investigate the effect of variation of dietary energy levels on early sexual maturity of buffalo.

MATERIALS AND METHODS

Twenty one buffalo heifers of one year age were maintained at Nutrition section of Livestock Production Research Institute, Buhadar Nagar, Okara. They were maintained under similar feeding and managemental conditions. These buffaloes were randomly divided into three groups (seven heifers in each) A, B, and C on the basis of fed energy level diet. Personal data of each buffalo heifer was ascertained from the Farm records.

This included brand no, date of birth, number and health status of the animals.

Three rations of varying levels of metabolizable energy (ME) were formulated. Ration A contained 80%; Ration B had 100% and ration C contained 120% of metabolizable energy content of National Research Council, (NRC) recommendations. The composition of each ration is presented in Table, I and II.

Respective rations in weighed quantities were offered to the heifers on morning on individual feeding basis in separate mangers. In the evening when they had eaten the ration they were let loose and had free access to water and freedom of movement within the barn. The trial continued for a period of one and half year. The age of sexual maturity (in months) was recorded when the animals had showed the first sign of heat or responded to teaser bull.

Table I. Composition of ration A, B and C with different energy levels (80,100 and 120% of NRC recommendation)

Ingredients	Ration A (%)	Ration B (%)	Ration C (%)
Cotton seed cake	38.00	15.00	9.00
Maize gluten 60 %	1.00	6.00	10.00
Maize grain	1.00	5.00	20.00
Wheat bran	1.00	23.00	5.75
Wheat straw	42.00	24.00	14.00
Molasses	12.25	15.00	20.00
Rice polishing	1.00	8.00	15.00
Urea	1.50	0.50	0.25
Vegetable oil	0.25	1.50	4.00
Mineral mixture	2.00	20.00	2.00
Total	100.00	100.00	100.00

Table: II Composition of ration A, B and C for protein and Metabolizable energy.

Type of feed	*Crude Protein (%)*	*Metabolizable Energy (M Cal)*
Ration A	14.56	201.58
Ration B	14.70	249.68
Ration C	14.91	298.26

Statistical Analysis: Data was analyzed according to Harvey, (1980) by using mixed model least squares and maximum likelihood computer programmed, (ISMLMW) PC-1 Version.

RESULTS

The study was conducted on growing buffalo heifers under similar feeding and managemental conditions. Different groups A, B and C, containing seven buffalo heifers each, were fed on rations of various energy levels i.e. 80, 100 and 120 percent of NRC recommendation, respectively, for a period of one and half year. Energy is the main constituent of ration for dairy and beef animals. This constituent is necessary for efficient growth and reproduction; however it has been generally realized that availability of this constituent in varying ratio in ration exerts significant effects on various parameters.

In present study, effects of varying level of energy on the age at puberty were recorded and shown in table III. The buffalo heifers of group C attained the puberty at the age of 21 months and 29 days, while the buffalo heifers of groups B fed on medium energy ration reached at pubertal stage of 23 months and 8 days and buffalo heifers of group A fed on low energy ration became mature at age of 22 months and 19 days. These results showed the non-significant difference among different groups, ($p<0.05$), (Table-IV).

Table III. Analysis of variance for age of maturity of buffalo heifers.

Age at Maturity (Days)	Ration A (%)	Ration B (%)	Ration C (%)
	679±16	698±20	630±18

Table IV. Analysis of variance for age of maturity of buffalo heifers

Source variation	of df	SS	MS	F-ratio
Age	2	5401.8	2700.9	0.114NS
Error	18	427569.2	23753.84	

DISCUSSION

The buffalo heifers of group A fed on low energy ration became mature at age of 22 months and 19 days while the buffalo heifers of groups B fed on medium energy ration reached at pubertal stage of 23 months and 8 days and buffalo heifers of group C with 120% energy ration attained the puberty at the age of 21 months and 29 days. These results showed the non-significant difference among different groups, ($P<0.05$).

Bosticeo *et al*. (1970) found that there was certain relationship between energy value of ration and fertility in heifers, because the heifers fed the high energy level attained the puberty at the age of 14-15 month, seven months earlier than those fed on medium level. Galina and Arthur, (1989) found that factors affecting age at first calving indicate that the onset of ovarian activity in Zebu cattle occurs around 22 months of age and that cross-breeding, particularly with Jersey bulls, can reduce this interval to as little as 15 months. Year and month of birth, rainfall during the growth period, and supplementation in the dry season were the most

important indicators found to affect the onset of puberty and subsequent reproductive performance.

Fajersson *et al*. (1991) noted that dietary protein level had no effect on age at puberty, while Companile *et al*. (2004) stated that nutritional management and growth from the time of weaning and during the pre-pubertal period has a major influence on conception in buffalo heifers. Wehrman *et al*. (1996) demonstrated that precocious puberty was occurred spontaneously in some heifers. The incidence of precocious puberty was related to nutritional status, with precocious puberty occurring more frequently in heifers with higher average daily gains, body weights. Perhaps, if nutritional status was extremely favorable early in life, premature inactivation of oestradiol negative feedback system was possible, resulting in precocious estrous cycles.

The study revealed that weight gain and feed efficiency data indicates that NRC standard for larger cattle breeds are appropriate for growing buffalo heifers. Higher energy levels favored growth rate but had no effect on age of maturity in buffalo heifers. Physiological and hematological parameters are invariably affected by level of Energy, seasons of year and the age of animals.

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