UNIVERSITI PUTRA MALAYSIA

PERFORMANCE OF GAUR X CATTLE HYBRIDS

NOR AZMAN HAJI NGAH

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PERFORMANCE OF GAUR X CATTLE HYBRIDS

By

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This thesis is dedicated to :

my wife, Zuriyani binti Yusof

my two sons, Nor Azrin and Nor Azrai

and my late daughter, Allahyarhamah Azyan Nafra

for their patience, understanding and moral support.

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LIST OF ABBREVIATIONS

SF	-	SAHIWAL FRIESIAN
F1 HYBRIDS	-	GAUR X CATTLE HYBRIDS
PKC	-	PALM KERNEL CAKE
CMR	-	CALF MILK REPLACER
BSE	-	BREEDING SOUNDNESS EVALUATION
ICUN	-	INTERNATIONAL UNION FOR CONSERVATION OF NATURE AND NATURAL RESOURCES

Abstract of the thesis presented to the Senate
of Universiti Pertanian Malaysia in fulfilment of the
requirement for the Degree of Master of Science

PERFORMANCE OF GAUR X CATTLE HYBRIDS

by

Nor Azman bin Haji Ngah

October 1989

Supervisor : Assoc. Prof. Dr Haji Mohd Hilmi Abdullah, Ph.D.

Faculty : Veterinary Medicine and Animal Science

The phenotype, growth performance and the reproductive status of 60 heads of male and female gaur x cattle hybrids were recorded and compared with Sahiwal-Friesian crossbred cattle.

The main objectives of this experiment were to evaluate the phenotype of the hybrids, the growth potential for beef production and to assess the reproductive capabilities of these hybrids for future propagation.

The present result showed that the phenotypic features could be utilised to identify this gaur x cattle hybrids. They showed similar growth pattern as the Sahiwal-Friesian crossbred cattle indicating a faster growth rate at any phases of the growth curve. The fast growth rate and high carcass value of the gaur x cattle hybrids indicate that these animals have the potential for beef production.

The gaur x cattle hybrids were not sterile as speculated. The male hybrids showed normal libido and mating behaviour but rated as questionable potential breeders due to the small scrotal circumference, high incidence of sperm abnormalities and poor sperm quality. Natural mating involving the male hybrids were related to low pregnancy rate with a high incidence of pregnancy wastage, therefore not suitable for use as breeding bulls. However the female hybrids can maintain normal pregnancy, produce high calf crop and normal calf which indicate that they were not affected by the interspecific hybridization and may be used for the propagation of these animals.

Abstrak tesis yang dikemukakan kepada Senat
Senat Universiti Pertanian Malaysia sebagai
memenuhi keperluan Ijazah Master Sains

KEUPAYAAN KACUKAN SELADANG X LEMBU (SELEMBU)

oleh

Nor Azman bin Haji Ngah

Oktober 1989

Penyelia : Prof. Madya Dr. Haji Mohd Hilmi Abdullah, Ph.D.

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Ciri-ciri pegenalan fizikal (fenotaip), kadar tumbesar dan status pembiakan untuk 60 ekor (jantan dan betina) kacukan seladang x lembu (Selembu) telah dianalisa dan dibandingkan dengan lembu-lembu kacukan Sahiwal-Friesian (SF).

Objektif-objektif utama kajian ini adalah untuk menilaikan fenotaip kacukan tersebut, potensi pertumbuhan untuk pengeluaran daging dan menentukan keupayaan pembiakan Selembu untuk menambahkan bilangan pada masa akan datang.

Keputusan awal menunjukkan ciri-ciri fenotaip boleh digunakan untuk mengenalpasti kacukan Seladang x lembu. Mereka mempunyai corak tumbesaran yang serupa dengan lembu kacukan Sahiwal-Friesian tetapi telah menunjukkan kadar tumbesaran yang lebih cepat dan nilaian karkas yang tinggi bagi Selembu menunjukkan babawa ternakan ini mempunyai potensi untuk pengeluaran daging.

Selembu adalab didapati tidak mandul saperti yang diagakkan. Selembu jantan menunjukkan libido dan ciri-ciri mengawan yang normal tetapi diletakkan dibawah keupayaan potensi pembiakan yang dipersoalkan kerana mempunyai lilitan scrotal yang kecil, terdapat banyak sperma yang tidak normal dan kualiti sperma yang kurang baik. Kacukan tabii yang melibatkan Selembu jantan menunjukkan kaitan dengan kadar kebuntingan yang rendah dan pembaziran kebuntingan dan tidak sesuai digunakan sebagai jantan pembiak. Tetapi Selembu betina boleh mengandung, menghasilkan anak yang normal dan ini menunjukkan yang mereka tidak terlibat dalam masaaalah kacukan di antara spesis (interspesifik) dan boleh digunakan untuk menambahkan bilangan ternakan ini.

CHAPTER 1

INTRODUCTION

In 1974, the Malaysian Government through the Department of Veterinary Services (DVS) had decided a target of 80% self sufficiency for beef by 1990. Since then the DVS had embarked on various programmes in trying to increase and improve meat production towards achieving this goal. Among the programmes that had been implemented were:

a) up grading the small local indigenous Kedah-Kelantan (KK) cattle by crossing them with the larger exotic or improved breed of cattle through natural mating and artificial inseminations with the hope of establishing new breeds of beef cattle,

b) importation of feeder calves for feedlot schemes, both in the government farms and smallholder schemes,

c) importation of frozen meat to satisfy the country's demand for animal protein and

d) utilization of dairy calves for slaughter.

When an interesting incident took place in one of the DVS farms, the DVS has decided to add that as a special programme to the existing programmes. This incident occured in early

April, 1983 at Padang Hijau Farm, Kluang where a lone gaur (Bos gaurus hubbacki) or locally known as the Seladang, met and mated a group of crossbred dairy heifers (Bos indicus x Bos taurus). As a result of this chance mating, 12 calves were born on the farm, which calves look phenotypically different from normal calves (Ahmad Mahamood, 1984). Thus, blood samples were sent to the Cytogenetic Laboratory, Faculty of Veterinary Medicine and Animal Science, Universiti Pertanian Malaysia for chromosome analysis.

The karyotype of these calves were analysed and found to possess chromosome complement 2n=58, a complement different to that of their parents; the chromosome complements for the crossbred heifers were 2n=60 while the gaur were 2n=56 (Bongso and Hilmi, 1989). Since the chromosome complements of these calves were intermediate to that of the dam (Sahiwal-Friesian) and the sire (Gaur), these new born calves were confirmed to be hybrids of interspecific hybridization between gaur and cattle. The resulting gaur x cattle hybrids were shown, on preliminary observation, to exhibit better productivity than crossbred cattle by showing better growth rate and bigger body size. They also showed no difficulties in the local enviroment. With this characteristics, the F1 hybrids were thought to have potential for increasing beef production in Malaysia. A special programme involving the interspecific hybridization between

Sahiwal-Friesian crossbred cows to the gaur sire was created by the DVS at the Padang Hijau Farm. The main objectives laid down for this programme were :

a) to increase the number of gaur x cattle hybrids by allowing the crossbred cattle to mate with the lone gaur on the farm as well as using other sources of gaur in the country through natural mating or artificial insemination,

b) to determine the growth performance of gaur x cattle hybrids at different phases of growth under different planes of nutrition and compare these values with those of cattle,

c) to determine and compare carcass characteristics and dressing percentage between the gaur x cattle hybrids and cattle,

d) to assess the reproductive status and breeding potential of the hybrids for continous propagations of gaur x cattle crossbreds,

e) to investigate the possible barriers of hybridization through chromosomal studies and

f) to embark on the conservation of a gene pool of gaur x cattle hybrids by backcrossing and upgrading.

Hybridization between two different species (interspecific hybridization) often takes place at experimental stations or by chance mating under natural condition. The resulted male or female hybrids are often associated with problems related to reproductive capabalities although occassionally their fertility may not be affected (Gray, 1957). Most hybrid animals, particularly those with different chromosome complement between two species are typically sterile (Benirschke, 1967), as observed in the case of crosses between the horse and donkey (Mc Govern, 1976). Even when the chromosomes of the hybrids are apparently identical, fertility may be effected (Basrur and Moon, 1967). Haldane (1922) predicated that if such fertility problems were to occur, the heterogametic rather than the homogametic sex should be adversely affected. The prediction has been borne out in the males of bison (Bos bison) x domestic cow (Bos taurus) hybrids (Basrur and Moon, 1967), yak (Bos grunniens) x domestic cow hybrids (Popescu, 1969), mule x hinny hybrids (Benirschke, 1967) zebra cross horse hybrids (King, 1967) and female peregrine falcon x pairie falcon hybrids (Schmutz and Oliphant, 1987). However, report by Frechkops (1964) on equine hybrids

buffaloes with different chromosome complements. The gaur (Bos gaurus) x crossbred cattle (Bos taurus/Bos indicus) hybrids with 2 pairs of unidentical chromosomes may have impaired fertility as reported in other species.

Before embarking on extensive breeding programme, a proper and concise study should be done to assess its potential and viability. So far, other than scattered preliminary observations on the gaur x cattle hybrids and other hybrids, little study has been done in Malaysia or elsewhere to further justify the hybrids propagation programme.

The present study was divided into 4 experiments with a specific objective for each experiment:

a) Experiment 1 : Comparison of the phenotypic features of the gaur, the Sahiwal-Friesian cattle and the gaur x cattle hybrid.
   Objective : To establish identification characteristics of the gaur x cattle hybrids.

b) Experiment 2 : The evaluation and comparison on the growth performances between the Sahiwal-Friesian crossbred cattle and the gaur x cattle hybrids.
   Objective : To evaluate the beef potential of the gaur x cattle hybrids.

c) Experiment 3 : Evaluation and comparison on the male reproductive status of the gaur x cattle hybrids and Sahiwal-Friesian crossbred cattle using the breeding soundness evaluation technique (BSE).

Objective : To determine the reproductive capabilities of the male gaur x cattle hybrids.

d) Experiment 4 : Comparison between the reproductive performances of male and female gaur x cattle hybrids under natural mating condition and the performance of Sahiwal-Friesian cattle.

Objective : To determine the reproductive performance of male and female gaur x cattle hybrids.

The results obtained from this study should provide sufficient basic information to help formulate an appropriate breeding policy through hybridization aimed at increasing the productivity of beef and conservation of the gaur which is now considered an endangered species.