«BOS TAURUS» CATTLE IN TROPICAL AUSTRALIA

Le betail «Bos taurus» dans l'Australie tropicale

El vacuno «Bos taurus» en la Australia tropical

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Presently, a large proportion of Australia is restricted to beef cattle production (*vide* Figure 1). Yet there were no indigenous cattle in Australia. The *Bos taurus* British breeds, viz. Shorthorns, Herefords, Devons and Angus, were imported from Britain over a century ago. The breeds were expected to hold their own under all environments encountered. Understandably, the breeders had no alternative but to assume that the particular *Bos taurus* breed of their choice could perform optimally. Over six million such cattle exist presently in harsh, dry or even tick infested humid tropical regions. Research to determine how to improve the existing catle for beef production has not been hotly pursued; probably due to lack of alternative genotypes due to rigid quarantine isolation.

DOWLING (1970) investigated the existence of «adapted» strains. Neither such a strain nor a cattle breeder who claimed that he had bred an «adapted» strain was found. Nevertheless, that many individual cattle and several herds performed so creditably was indeed a tribute to the cattlemen who were handicapped by the lack of facilities and the custom which was traditional, of importing smaller fatter bulls. Cattle did adapt for survival, but on a productivity score, the cattlemen considered that one particular herd viz. the «Austral Downs» purebred Shorthorn herd were exceptional (*vide* map Figure 1). The beef potential of the «Austral Downs» strain, estimated most likely to be «adapted» in a survey to discover such cattle, is reported. Uniquely, Shorthorns and Herefords still predominate in the Tropics of Australia. However, the remarkable technological progress in the processing of semen and evaluation of cattle for beef production may expedite change.

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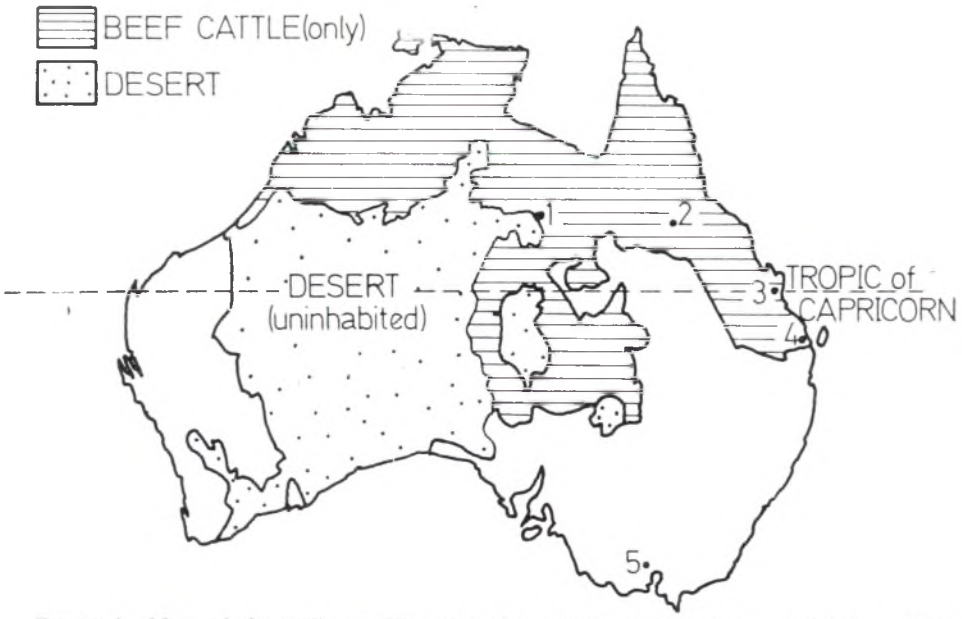

FIGURE 1. Map of Australia to illustrate the extent of the area restricted o Cattle Production. The test centres are shown. 1, Austral Downs; 2, Torrens Creek; 3, Belmont Csiro; 4, Brian Pastures D.P.I.; 5, Meridith.

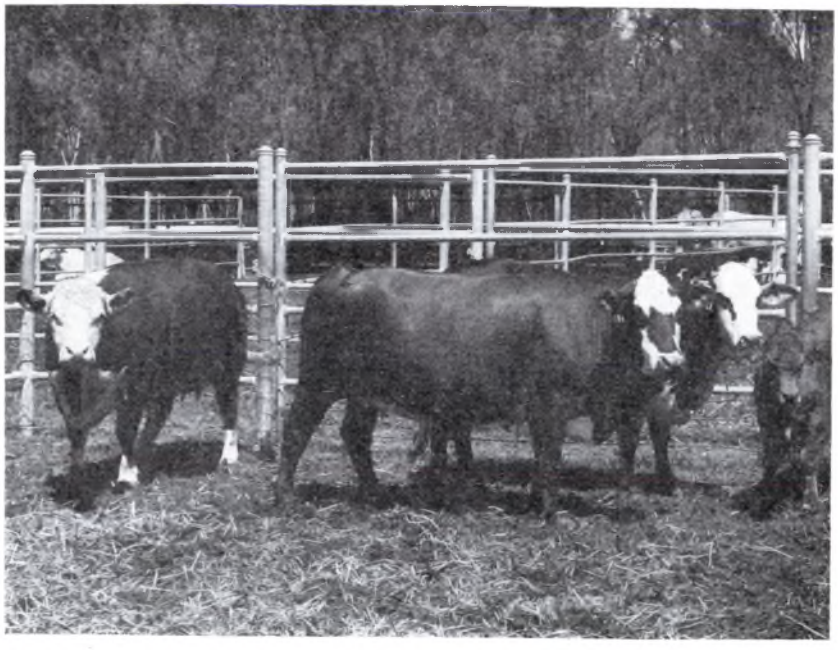

FOTO 1

Also now, with better transport from the breeding to improved finishing areas, it may be more patently obvious, that the cattle breeder may be negating his beef production efforts too much by neglecting to use selected quieter *Bos indicus* cattle for tick resistence and vigour, and «lean beef» breeds for carcass and growth to improve cattle to equal their changing environment and to meet future demands of a heavier younger carcass. Hence, the purpose of this paper is to report the carcass potential of the adapting strains of Bos taurus cattle under pasture tropical conditions.

Foto 2.

Cattle and methods

The cattle and methods used have been described (Dowling, 1960, 1964). Figure 1 shows location of the test centres.

The care and effort required to obtain the cattle for meaningful comparison is emphasised. To test a sample of «adapted» cattle, cows at the same stage of pregnancy were taken from Location 1, Figure 1, to the very hot tropical but *tick free* testing station (Location 2, Figure 1) where the group of 40 calves were born over a 2 week period and within the six week period set for the calving period for all the groups. The calves were pastured together to eliminate pretest variation and nutritional stress. Hence it was possible to breed and compare the performance, in the same tropical environment, of a hybrid group and four

groups of health monitored Shorthorns, viz.: 1) *Z X*, Brahman cross Shorthorn hybrids; 2) *S*, Selected registered Shorthorns; 3) *A*, a morthern type, later maturing, purebred Austral Shorthorn; 4) *AIS*, registered Australian Illawarra Milking Shorthorns; 5) *R*, unselected registered Shorthorns.

Results

For liveweight, carcass weight and fat depth, for each of the 5 groups, the

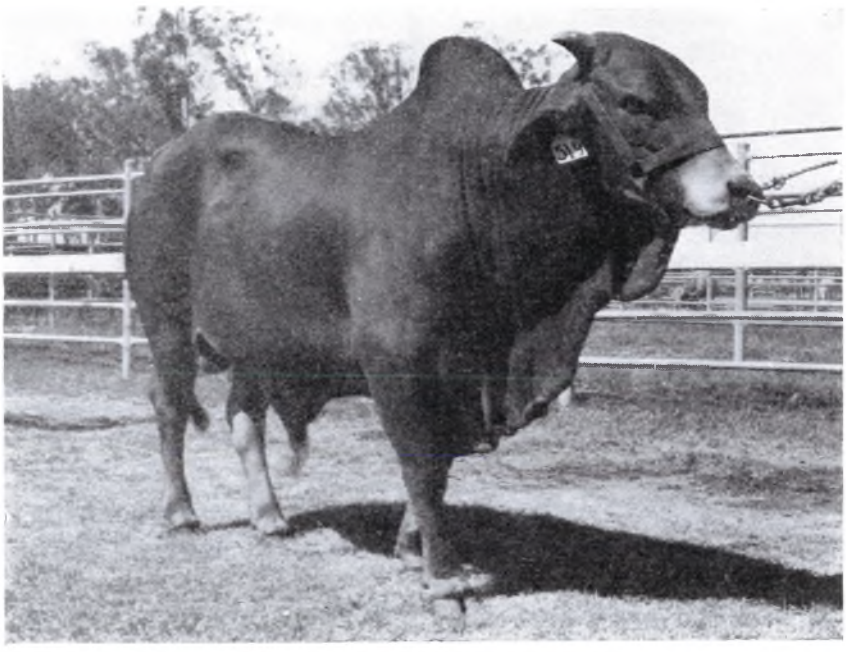

Foto 3.

means, and standard errors (S. E.) were calculated. Analyses of variance and *t* tests were carried out to ascertain any differences between groups. The results are recorded in Table 1.

An analysis of covariance of carcass weight (as the independent variate) with fat depth (dependent variate) were carried out on the University's computer. After adjustment for carcass weight, an analysis of variance and *t* tests on fat depth yielded the results shown in Table 1.

The analysis of covariance was done to refute any suggestion that, for example, from the above, the *AIS* group had significantly less fat than the *Z X* and selected groups simply because the carcasses of the *AIS* group were lighter than those

TABLE 1

MEANS AND STANDARS ERRORS OF CARCASS MEASUREMENTS IN THE COMPARISON OF FIVE STRAINS OF CATTLE

Group	No.	Live weight (Kg)	Carcass weight (Kg)	Fat depth (cm)	Actual beef (Kg)	Fat content (Kg)
		Mean and S. E.	Mean and S. E.	Mean and S. E.	Mean and S. E.	Mean and S. E.
Z	1	627.13 ± 14.15	373.58 ± 9.15	1.55 ± 0.15	192.7 ± 4.13	134.9 ± 0.04
Selected	2	624.32 ± 10.67	351.35 ± 6.94	1.41 ± 0.12	186.2 ± 6.23	119.4 ± 4.95
Austral	3	602.37 ± 15.43	338.06 ± 7.26	1.22 ± 0.08	184.5 ± 4.56	107.0 ± 4.11
AIS	4	599.83 ± 12.63	322.91 ± 7.75	0.93 ± 0.16	183.2 ± 3.41	91.5 ± 8.66
Random	5	530.70 ± 17.35	295.24 ± 11.16	1.19 ± 0.12		91.6 ± 4.5
		1, 2, 3, 4 > 5 ($P < 0.05$)	1 > 3, 4, 5 ($P < 0.01$) 2, 3, 4 > 5 ($P < 0.01$) 2 > 4 ($P < 0.05$)	1, 2 > 4 ($P < 0.05$)	1, 2, 3,4 > 5 ($P < 0.01$)	1 > 3, 4, 5 2 > 4, 5 ($P < 0.01$)

of the *Z X* and selected groups. In fact, the analysis shows it had *proportionately* less fat.

It is also meaningful to compare the fat depths by themselves — as they stand, to ascertain any differences between groups. Analysis of variance and *t* tests for this were thus done yielding the results as set out in Table 1.

For actual beef content, analysis showed the following significant differences among groups: The Brahman crossbreds, Selected and Austral Shorthorns and *AIS groups* were significantly better than the Random (unselected registered beef

Foto 4.

group) ($P < 0.01$) (F value of 4.45 on 4 and 45 d. f.). Whereas for fat content, the analysis showed that the crossbred group *Z X* had a higher total fat content than Australs, *AIS* and Random ($P < 0.01$), with the heavy selected group, more than *AIS* and Random ($P < 0.01$) (F value of 7.96 on 4 and 45 d. f.).

The explanation of this is that the dams of the *Bos indicus* hybrids and the selected *Bos taurus* are *fat* beef type whereas the *AIS* is a dairy type and though heavy has less fat. Thus the crossbreds were significantly heavier than the selected group and though less «finished» had a heavier total fat weight. The random group are smaller and though relatively fatter have less weight of fat than the heavier selected group which of course, had a highly significant better beef content.

Discussion

The consumer wants a minimum of fat and the heavy carcass is economical. What could be expected from the straight *Bos taurus* cattle existing still in tropical Australia? The cattle were tested under similar pretest tropical conditions and the above results showed that healthy *Bos taurus* cattle produced beef within their apparent genetic capacity depending on the nuture and degree of freedom from stresses and parasites. For example, even the random group of unselected

Foto 5.

registered Shorthorns (*Bos taurus*) performed better, in that it produced more beef in a hotter environment (Location 2), than *Bos indicus* crossbreds i.e. in a tick infested coastal environment on the same latitude in the tropics (Site 3 on map) (Kennedy & Turner, 1959). Hence it may be pertinent to consider also two other sets of observations which were made concurrently. Firstly, *Bos taurus* cattle at location 4 in the sub-tropics, on an improved pasture and management system, but also infested with parasites, were significantly less productive. (Alexander & Chester, 1956). *AT* this time also, *Bos taurus* cattle at location 5 (Robinson & Cameron, 1960), under favourable temperate beef cattle management conditions did not perform as well as *Bos indicus* or *Bos taurus* cattle in the tropics, under high radiant heat loads but, where the Mitchell (*Austrebla* sp.)

hayed beneficially. The cattle in the temperature region, though not subjected to the biometeorological stresses of the Tropics, were affected more adversely by winter dormancy of the pastures.

Thus, a careful appreciation of the experiment reported above may reveal the care and perseverance required to obtain results which have technical validity. The picture which emerged from the study and selection of the existing *Bos taurus* strains was clear. Greater gains may accue from cross-breeding selected existing stock with suitable *Bos indicus* infusions to develope the hybrids (DOWLING, 1970, 1973).

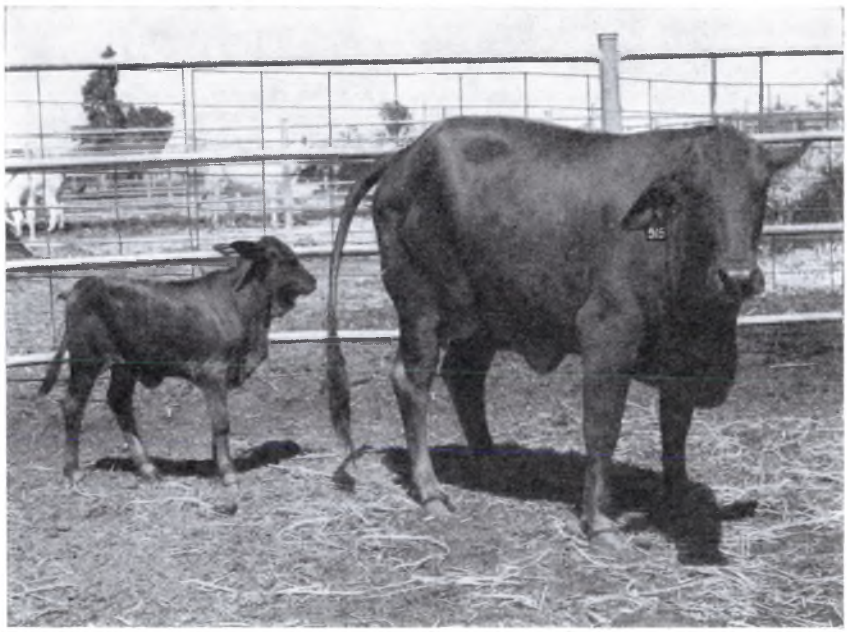

FOTO 6.

Selection for growth gave significantly better results. Recently, CHARLES (1973) has developed a method to estimate total lean and fat on the live animal. The highly significant heavier carcasses of the selected group contained more beef but also more fat deposition i.e. a distinctive strain character of early maturity which means more fat compared with a dairy type *AIS* strain where there is inherently less fat. Incidentally, is it not for this reason that the «lean beef» beef breeds are presently being used to get the heavy but leaner carcass at an earlier stage to maturity? Obviously, the existing *Bos taurus* cattle require infusions of both *Bos indicus* and lean tissue traits to withstand better, external parasites eg. the cattle tick (*Boophilus microplus*), internal parasites and mineral imbalances, and to adjust to lower cost beef production in the Tropics of Australia.

SUMMARY

Australia's most valuable resource is cattle. Presently, a large proportion of Australia is restricted to beef cattle production. Yet there were no indigenous cattle in Australia. The *Bos taurus* British breeds, viz. Shorthorns, Herefords, Devons, Augus were imported from Britain over a century ago. To-day, over six million cattle of this origin exist in harsh dry or even parasite infested tropical regions, partly due to lack of alternative genotypes due to rigid quarantine isolation.

Dowling surveyed the cattle. He tested the carcass potential of these cattle under extensive tropical conditions. Clearly, the existing *Bos taurus* cattle under extensive tropical conditions. Clearly, the existing *Bos taurus* cattle required infusions of *Bos indicus* cattle. The development of hybrid dams is the necessary precusor to further progress.

In the many different environmental conditions in Australia, discrimination is needed both in the selection of the *Bos indicus* infusions to produce the hybrid dams, and the use of the recently available larger lean beef European breeds. The improvement of the existing cattle for heavier slaughtr wights to satisfy a quantity grade superimposed on quality classifications is needed for low cost production. The hybrid dam lines give increased fertility, calving ease and livability of the calf for the appropriate sire eg. Chianina and Sahiwal for the tropics.

RESUME

La ressource la plus précieuse de l'Australie c'est le bétail. Actuellement, une partie importante de son territoire est dédiée à la production de bétail à viande. Cependant, il n'y existait de races indigènes: les races britanniques *Bos taurus* (Shorthorns, Herefords, Devons et Angus) furent importées d'Angleterre il y a plus d'un siècle. Aujourd'hui, il y existe plus de six millions d'animaux ayant cet origine, dans des régions très sèches ou, inclus, dans des régions tropicales infectées de parasites. La raison de ceci se trouve partialement dans le manque de génotypes alternatifs, dûeau sevère isolement par quarantaine.

Dowling réalisa un travail sur le bétail. Il analysa le potentiel de leur canaux sous des conditions tropicales extensives. Le bétail *Bos taurus* existent requit clairement des infusions de bétail *Bos indicus*. Le pas nécessaire pour arriver à un progrès postérieur c'est le développement de mères hybrides.

Si l'on considère les énormes différences des conditions de l'ambiance en Australie, il apparaît comme une nécessité la discrimination dans la sélection d'infusions de *Bos indicus* pour la production de mères hybrides et l'usage des races européennes à viande maigre, dont la disponibilité est encore récente. Pour obtenir un bas coût de production, il est nécessaire l'amélioration du bétail existent quant à ce qu'il doit péser au moment d'être sacrifié, afin que le degré exigé dans les clasifications qualitatives soit accompli. Les lignes maternelles hybrides sont la cause d'un accroissement de fertilité, d'une facilité pour les accouchements, et d'une augmentation des possibilités de vie des veaux, pourvu que l'étalon soit le plus convenable (p. ex. Chianina et Sahiwal pour les tropiques).

RESUMEN

El recurso más valioso con que cuenta Australia es el ganado. En la actualidad se encuentra restringida a la producción del ganado de carne una parte importante de su territorio. Y, sin embargo, no existían en éste razas indígenas: las razas británicas *Bos taurus* (Shorthorns, Herefords, Devons y Angus) se importaron de Inglaterra hace más de un siglo. Hoy día existen más de seis millones de animales de este origen en regiones muy secas o incluso en regiones tropicales infestadas de parásitos. La razón está parcialmente en la falta de genotipos alternativos debida al rígido aislamiento por cuarentena.

DOWLING realizó un estudio del ganado. Sometió a análisis el potencial de sus canales bajo condiciones tropicales extensivas. El ganado *Bos taurus* existente requirió de forma clara infusiones de ganado *Bos indicus*. El paso necesario para lograr un progreso posterior es el desarrollo de madres híbridas.

Considerando las grandes diferencias de condiciones ambientales en Australia, aparece como una necesidad la discriminación en la selección de infusiones de *Bos indicus* para la producción de madres híbridas y el uso de las razas europeas de carne magra cuya disponibilidad es reciente. Es necesario para conseguir un bajo costo de producción la mejora del ganado existente con relación al peso al sacrificio para satisfacer el grado exigido en las clasificaciones cualitativas. Las líneas maternas híbridas son causa de un incremento de fertilidad, de facilidad en los partos y del aumento en las posibilidades de vida en los terneros siempre que el semental sea el más conveniente (vgr. Chianina y Sahiwal para los trópicos).

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