

## DEVELOPMENTS IN DAIRY CATTLE BREEDING IN TROPICAL SOUTH AMERICA

Progrès dans l'élevage bovin laitier dans l'Amérique du Sud tropicale

Progresos en la cría de vacuno lechero en la América del Sur tropical

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This paper aims to give a brief survey of dairy cattle breeding in the tropical countries of South America which, for this purpose, are taken to be Bolivia, northern Brazil, Colombia, Ecuador, Peru and Venezuela. Collectively the region is characterised by an extreme range of climatic types. Of particular importance in this context is the modifying influence on temperature of the altitude of the Andes mountains in large parts of all the countries except Brazil, and the cooling effect of the HUMBOLDT Current on the climate of coastal Peru.

While the majority of milked cattle may still be in the hands of small farmers and landless peasants, most of the milk in the region is produced on larger farms using modified feed-lot systems (peri-urban) or grazed swards (in highland areas e.g. Cajamarca, Peru, altitude: 2,200 m). Most of these farms are located where heat stress is not severe and Holsteins of North American origin are increasingly popular. Some examples of performance on farms of this type are shown in Tables 1-3. Among recent studies of interest are those which suggest how serious a problem poor reproductive efficiency may be in such herds (e.g. ZEMJANIS & SANINT, 1963) and how important in this connection are adequate artificial (a.i.) techniques and at least two inspections each day for oestrus (e.g. ZEMJANIS & SANINT, 1963; FENTON *et al.*, 1972). There is considerable interest in the comparative performance under South American conditions of Holsteins and Friesians of

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*Examples of performance of dairy cattle in officially recorded herds in South America*

TABLE 1  
 MEAN STATISTICS FOR HOLSTEINS IN ECUADOR DURING 1948-67  
 (Source: ROMAN, 1970)

Genetic type	No. of records	Milk yield (Kg)	Age at 1st calving (mo)	Interval between lactations (mo)
Registered ... ..	7,307	3,888	31.2	14.8
Grade ... ..	26,293	3,118	33.7	14.3

TABLE 2  
 RECENT TRENDS IN NUMBERS OF OFFICIALLY RECORDED COWS AND THEIR YIELDS  
 IN COASTAL PERU

(Source: PALLETE *et al.*, 1969, 1973)

Year	Breed	Number of		Mean age-corrected 305-day milk yield (Kg)
		cows	herds	
1968 ... ..	Holstein	1,563	17	4,974
	Brown Swiss	170	8	4,486
	All	2,225		
1972 ... ..	Holstein	3,285	25	5,341
	Brown Swiss	189	7	4,825
	All	4,677		

TABLE 3  
 MEAN PERFORMANCE OF VARIOUS BREEDS IN 324 HERDS NEAR SÃO PAULO, BRAZIL, DURING 1945-66  
 (Source: ALVES NETTO *et al.*, 1967)

Breed	Lactation records		Age corrected 305-day milk yield (Kg)	Butterfat %	Age at 1st calving (mo)	Interval between lactations (days)
	No.	% of total				
Holstein:						
Black & White ... ..	21,144	57.2	3,605	3.59	34	369
Red & White ... ..	3,211	12.3	3,454	3.66	32	372
Jersey ... ..	2,476	6.7	2,476	4.90	26	373
Brown Swiss ... ..	1,722	4.9	2,585	3.82		
Gir ... ..	890	12.5	2,215	4.89		
Pitangueiras * ... ..	363	Not given	2,804	3.89		
Guzerat ... ..	89	1.3	1,811	5.72		

\* 5/8 Red Poll, 3/8 Guzerat.

different national origins. Existing data, as yet inconclusive, are shown in Tables 4 and 5 and suggest that the European type may have an advantage where milk is priced according to solids content. Another comparison of U.S. Holsteins and Dutch Friesians has recently been started under experimental conditions in Venezuela (FENTON *et al.*, 1972). There is also current concern as to whether dairy sires should be selected specifically for tropical environments. Some evidence comes from Ecuador where ROMAN (1970) found that the sire  $\times$  herd component accounted for only 2.9% of the total variation in milk yield. The location of the farms studied varied from 2,250 m to 3,100 m above sea level with annual mean temperatures in the approximate range 10°C to 17°C. While this does not represent an extreme climatic range, the results lend no support to the view that genotype  $\times$  environment interactions for milk yield may be of practical importance.

Comparatively little attention has been given to dairy production in the hot lowland areas of the region. In Peru, at least, intensive systems would seem to be necessary to defray the high cost of clearing and maintaining jungle land but the high energy foods and skilled labour which would then be required are in short supply. Present plans include the development of local industries based on dual purpose zebu breeds, representatives of which have recently been imported. In the Amazonas region of Brazil, crossbreeding Red Sindhi and Jersey cattle continues, following the experience of the Allahabad Agricultural Institute in India. So far, animals with 5/8 Jersey inheritance seem most promising, producing mean 365-day yields of 2,956 Kg milk at 4.6% fat, about double the quantity given by the Red Sindhis (DO NASCIMENTO & DE MOURA CARVALHO, 1973). Work with buffaloes includes the comparison of various breeds for dairy use and the grading

*The comparative performance in two regions of South America of Holsteins and Friesians of different national origins*

TABLE 4

MEAN PERFORMANCE OF IMPORTED AND HOME-BRED HOLSTEIN COWS IN OFFICIALLY RECORDED HERDS IN COASTAL PERU DURING 1958-68

(Source: SARMIENTO, 1970)

Origin of cattle	No. of records	Age-corrected 305-day milk yield (Kg)	Calving Interval (mo)
Imported:			
U. S. A. ....	617	5,125	13.9
Canada ....	529	5,263	14.4
Home-bred:			
Registered ....	1,635	4,931	13.7
Non-registered ....	1,401	4,917	13.5

TABLE 5

MEAN PERFORMANCE OF HOLSTEINS AND FRIESIANS IN OFFICIALLY RECORDED HERDS NEAR  
SÃO PAULO, BRAZIL, DURING 1945-66

(Source: ALVES NETTO *et al.*, 1967)

Origin of cattle	No. of records	Age-corrected 305-day yield (Kg)		Butterfat %
		Milk	Fat	
Canada & U. S. A.				
(Holsteins) ... ..	537	3,958	138	3.47
Holland (Friesians) ...	2,509	3,785	144	3.80

up of local animals to Murrah stock. A comparison of European breeds, the native («criollo») Costeño con Cuernos, and crossbred cattle progresses in northern Colombia. Comprehensive data have not yet been published but the existing information suggests a real superiority on the part of the crossbreds in view of the poor reproductive performance of the exotic stock (Table 6), information about the production of various breeds and crosses under commercial conditions in the lowland tropics is available from Venezuela. Some of the data, shown in Table 7, suggest that milk yields rise with increasing levels of European-breed inheritance, but comprehensive comparisons are still awaited and milk yields alone may not reflect total profitability if differences between native, European and crossbred stock in survival rates and fertility are as important as existing evidence suggests (e.g. RIOS *et al.*, 1965; HUERTAS, 1972).

In general, genetic causes must be regarded as a relatively minor factor in accounting for the slow rates of development of these nations' dairy industries. Problems due to inadequate feed supplies, disease, poor management and lack of marketing organisation are acute in many areas. Nevertheless, genetic progress in unnecessarily slow, despite the existence of first class stock and facilities (e.g. recording and a. i. services) to increase their influence in at least certain parts of the countries in question. This is partly due to ignorance at official and farm levels of optimum selection criteria for dairy breeding stock. An illustration is provided by a study in coastal Peru where it was found that 42% of the a. i. bulls used by Holstein dairymen had negative progeny test ratings (VACCARO *et al.*, 1968). One consequence is the tendency to prefer to import stock, unlikely to be genetically first class, rather than to use semen of foreign bulls proven to be superior and invest the savings in efforts to augment the numbers of herd replacements reared locally. In addition, genetic improvement efforts and research are directed mainly towards the few elite herds and little advantage filters down to the large populations of smallholders' cattle. Breeding research information from the hot lowland regions is still negligible, despite the numerous projects started and resources devoted to them. This is due to difficulties over the design and analysis of such experiments and also to the lack of constant policies. In fact,

Examples of performance of dairy cattle under lowland tropical conditions in South America

TABLE 6

MEAN PERFORMANCE OF VARIOUS BREED GROUPS AT TURIPANÁ, COLOMBIA (ALTITUDE APPROX.: 15 M)

(Sources: PINEDA, 1971 \*; HUERTAS, 1972 \*\*)

Breed	Milking performance *		Reproduction **		
	Yield-day (Kg)	Days	No. records	No. services per conception	% pregnant by 100 days <i>post partum</i>
U. S. Holstein (H) ... ..	11.0	305	216	3.0	55
U. S. Brown Swiss ... ..	11.0	305	52	2.6	67
Costeño con Cuernos (CCC) ... ..	4.6	180	475	1.7	65
1/2 H × 1/2 CCC ... ..	10.0	300	90	1.9	81
3/4 H × 1/4 CCC ... ..	10.0	298	—	—	—

TABLE 7

MEAN PERFORMANCE OF DAIRY CATTLE ON COMMERCIAL FARMS IN VARIOUS LOWLAND REGIONS OF VENEZUELA

Location, date	Breed *	Milking performance			Calving Interval (days)	Source
		No. records	Yield (Kg)	Days		
Carora region, 8 farms, 1961-65.	BS × C:	6,673	2,903	318	451	CEVALLOS <i>et al.</i> (1968).
	Type A		2,976		450	
	Type B		2,860		455	
	Type C		2,700		457	
Rio Limón region, 5 farms, 1960-62	BS × C:	1,462	1,643	263	380	CENTRO DE INVESTIGACIONES AGRONÓMICAS (1969).
	Type A		1,710		376	
	Type B		1,558		369	
	Type C					
Rio Limón region, 11 farms, 1964	C	1,065	1,770	271	379	CENTRO DE INVESTIGACIONES AGRONÓMICAS (1970).
North Central region, 1946-66:	Farm 1	H	90	2,708	263	VERDE <i>et al.</i> (1968-1970).
		3/4H × 1/4C	1,376	2,600	275	
		M	—	1,686		
	Farm 2	M	1,764	2,818	—	
	Farm 3	7/8H × 1/4C	183	3,643	290	
		3/4H × 1/4C	877	3,560	285	
		1/2H × 1/2C	1,132	3,087	274	
		H	205	4,018	287	
		M	—	2,682	—	
	Miranda State, 1 farm, 1960-67, altitude 245-1,100 m.	BS	1,046	3,429	318	428

\* Key to abbreviations: BS = Brown Swiss; C = Criollo; H = Holstein; M = Miscellaneous cross; BS × C: Type A = crossbred, predominantly BS; BS × C: Type B = crossbred, intermediate; BS × C: Type C = crossbred, predominantly C.

the most serious obstacle to genetic progress and to the development of the region's dairy industries as a whole. However, the number of highly trained animal breeding specialists has increased sharply in recent years and, provided they are permitted to participate more fully than hitherto in decisions affecting the national dairy industries, the outlook for rapid progress is now promising.

#### RESUMEN

Este artículo trata del progreso reciente en la crianza y mejora del ganado bovino lechero en los países nortños de América del Sur. Se muestran ejemplos de niveles de producción en establos relativamente grandes, la mayoría de los cuales están ubicados en las zonas templadas de la región (apéndice 1). Se discuten algunos aspectos de la investigación relacionada a éstos, inclusive el comportamiento comparativo de razas de distintos orígenes (apéndice 2). El progreso en las zonas cálidas ha sido relativamente lento. Se presentan ejemplos de producción lechera en estas zonas (apéndice 3) y se señala la necesidad de obtener comparaciones comprensivas entre los distintos tipos genéticos. Finalmente, se discuten los problemas que actualmente obstaculizan el progreso de la cría y mejora del ganado en el área.

#### RESUME

Cet article étudie le récent progrès de l'élevage et l'amélioration du bétail bovin laitier dans les pays du Nord de l'Amérique du Sud. On y montre des exemples de niveaux de production en étables assez grandes, dont la plupart se trouve dans les zones tièdes de la région (Appendice 1). On discute sur quelques aspects de l'investigation rapportée à ceux-ci, en y incluant la conduite comparative de races à différentes origines (Appendice 2). Le progrès dans les zones chaudes a été relativement lent. On présente quelques exemples de production laitière dans ces zones (Appendice 3) et on montre la nécessité d'obtenir des comparaisons compréhensives entre les différents types génétiques. Finalement, on discute sur les problèmes qui actuellement rendent plus difficile le progrès de l'élevage et l'amélioration du bétail dans cette aire-là.

#### ZUSAMMENFASSUNG

Dieser Artikel behandelt den jüngsten Fortschritt in Milchviehzüchtung in den nördlichen Ländern von Südamerika. Beispiele diesen Leistungen mit grossen Herden, welche meistens in Gegenden gefunden werden wo die Hitze weniger drückend ist, sind in diesem Anhang 1 gezeigt. Verschiedene Seiten der Forschungsarbeit in bezug auf solche Herden sind besprochen worden einschliesslich die vergleichsleistungen von verschiedenen Züchtungen in dieser Gegend (Anhang 2). Fortschritt in den heisseren Teilen dieser Gegenden waren verhältnismässig langsam. Beispiele der Milcherzeugung in solchen Gegenden sind in Anhang 3 gezeigt und die Notwendigkeit ist hervorgehoben für einen gründlichen allumfassenden Vergleich zwischen verschiedenen Entwicklungstypen zur Verwendung in solchen Zonen. Zuletzt ist das Haupthindernis für zukünftigen Fortschritt in der Milcherzeugung in solchen Gegenden in Erwägung gebracht.



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