SPEAKING FOR JERSEYS AROUND THE WORLD

INVESTIGATORS

Dr. R.E. McDowell
Visiting Professor
International Animal Science
North Carolina State University

Dr. Stanley Makuza
Professor
Animal Breeding
University of Zimbabwe
Harare

Dr. J.C. Wilk
Professor
Dairy Cattle Breeding and Management
North Carolina State University

INTRODUCTION

Some may question the relevance of this project title. It was chosen on the premise that we in the U.S. and other countries located in the cooler climates have developed the technology of high performance in the Jersey breed. A very pertinent question at this time is, can our technology effectively be transferred to the warmer climates and for the most part the lesser developed areas of the world?

Generally, we think of the hot climate areas (tropics) of the world as those countries lying in part or wholly between the Tropics of Cancer and Capricorn. However, the "high stress" zone is larger, approximately the North-South 30° latitudes. This zone passes through the U.S. along the line Jacksonville, Florida, New Orleans and San Antonio, Texas, then West

through Southern China, New Delhi, India, and Cairo, Egypt. The southern limit in South America is the northern border of Uruguay, then to the upper half of South Africa and the upper two-thirds of Australia. We term this area the "Warm Climate Zone" (WCZ).

In the WCZ, the main grasses used for grazing differ from cooler climates. They grow rapidly in response to rain and mature early therefore it is more difficult to maintain high quality feed supplies. For most of the WCZ, rainfall is either low or excessive with wet and dry seasons. Maximum daily temperatures usually do not rise any higher than in North Carolina or Missouri but persist for more hours of the day and months of the year. Collectively, this means the WCZ presents challenges that differ in several respects to achieve milk yields from our "high technology cows".

For well over 100 years, improved dairy breeds have been shipped to countries in the WCZ. The prevailing philosophy of the receivers of the imports was all that was needed to get higher milk output was to "change the breed" giving no recognition for need to create appropriate feeding and management practices. The shippers of the cattle were just as remiss in thinking that "new cows" would automatically lead to locals changing their practices without being given guidance. During the same period, governments wished to improve their image among farmers by giving them "new cows"; hence governments, either directly or through foreign donor agencies mainly financed the importations. In combination, the philosophies and policies led principally to failures.

Fortunately, situations are changing in countries of the WCZ. Governments are under high pressure to rapidly increase domestic milk supplies for satisfying the needs of rapidly expanding urban centers. In much of the WCZ, milk production is now rising by 4 to 7% per year, using mainly crosses of dairy breeds with local type cattle and high grade or pure dairy breeds. The growing of corn is the most rapid expanding agriculture crop in the WCZ; much

of which is being used for poultry, pig and cattle feeding. Among dairy operators there is now recognition of need for feed storage to lower the impact of seasonal changes in forages. Corn silage making is gaining in a number of countries. Also use of by-products, such as cotton seed cake, peanut cake, soybean meal and brewers grains are gaining in use as supplementary feeds. More changes are needed in health and other practices but the central point is that awareness of needs for "new practices" is advancing.

To explore the validity of transfer of technology to countries of the WCZ, we chose to determine where Jerseys and their crosses are in use. Secondly, we had through Dr. Makuza a good set of records on Jerseys, Holsteins and crossbreeds in Zimbabwe, a country of Africa located in the southern zone of WCZ (14-17° South latitude). Thirdly, DHI records on Jerseys in 12 southeastern states were used to compare with performance in Zimbabwe in order to discern whether direct transfer of technology or modifications will be best.

JERSEYS IN WCZ COUNTRIES

In Table 1 are listed 26 countries of the WCZ where pure Jerseys have been evaluated along with 6 other countries testing only Jersey x Native breed crosses. Findings are that the 15 Native breeds have higher fat percentage in their milk than Jerseys (Table 2) but are poorer for all other traits. For instance, long calving intervals of the Natives result in only 64% of lactation milk or 650 kg being credited on a yearly basis. In the same herds, Jerseys recalved in 402 days, hence get 90% credit per year (2,434 kg). It is readily evident from performance of Native breeds that changes in genotype are required to develop dairying and Jerseys can exercise an important role in changing the situation.

Performance of first generation (F_1) Jersey x Native breed crosses exceed the parental average by 11% in milk yield (Table 2) and excel the Native breeds in all other traits. This

shows that the F_1 cross can be a creditable step for grading-up in dairy production.

Among the creditable features of Jersey performance in the 26 countries of the WCZ are:

- heifers can be satisfactorily bred at younger age
- they can be early calvers
- have greater reproductive efficiency
- make quick use of stored fat in early lactation
- maintain near normal fat percentage on variable feeding levels
- have high milk output per kg of body weight
- is best breed in supportive traits
- short calving interval results in higher milk credit on yearly basis (≥90%)

Table 1. Countries of Warm Climate regions (N-S 30° latitudes) where Jersey and Jersey x local breed crosses have been evaluated since 1970.

Africa	Asia	Latin America	Oceania
	Purebreds and Crosses		
Egypt	China	Brazil	Australia
Ethiopia	Fiji	Costa Rica	
Kenya	India	Haiti	
Libya	Iran	Honduras	
Nigeria	Pakistan	Mexico	
Senegal	Philippines	Venezuelu	
Seychelles	Saudi Arabia		
Tanzania	Turkey		
Uganda	United Arab Republic		
Zimbabwe			
	Crosses Only		
Ivory Coast	Bangladesh		
	Indonesia		
	Malaysia		
	Nepal		
	Sri Lanka		

Source: Adapted from Tibbo et al. (1994)

In the WCZ, Jerseys are approximately 20% lower in body weight because of temperature stress and lower quality feeds but the decline in FCM yield per kg of body weight is only 8% lower than in the U.S. This means their biological efficiency can continue to be reasonably good under poorer conditions. Jerseys excel other dairy breeds in this respect. The conclusion is that although herd environments in WCZ countries are currently medium to poor, Jerseys can have significant potential for increasing dairy production in the WCZ.

Table 2. Average performance of Jerseys versus that of native breeds and first generation crosses (F_1) for 26 countries.

Measures	Native breeds	Pure Jersey	F_1 Crosses
Milk yield (kg)	1,016	2,704	2063
Lactation length (d)	282	291	313
Fat yield (kg)	50	135	93
FCM (kg)	1,156	3,107	2220
% Fat	4.97	4.53	4.50
FCM per kg body weight (kg)	3.8	8.4	5.8
Age at 1st calving (mo)	42.5	30.6	31.7
Calving interval (d)	497	402	400
Services for conception	2.2	1.9	2.0
Death losses birth to calving (%)	13.0	7.0	13.1
% Milk credit/yr	64	90	91

JERSEYS IN ZIMBABWE AND SOUTHEASTERN U.S.

Zimbabwe is a land locked country in Southeastern Africa with rainfall approximately one-half that of the Southeastern U.S. and maximum daily temperatures exceed 32°C (90° F) for about 10 months. The country is low in natural resources and in industrial development, therefore highly dependent on the export of agricultural products. Major exports include cotton, tobacco, corn and it is among the world leaders in exporting fresh cut flowers enjoyed on occasion by AJCA wives. Interest is high in furtherance of the export of butter, cheeses and breeding stocks of cattle to neighboring countries. The national dairy herd consists of purebred

Jerseys and Holsteins, grade cattle principally of Jersey and Holstein breeding and crosses of these breeds with local cattle. Local breeds have been kept to provide draft power and beef production so Zimbabwe needs "dairy cows".

Records from 28 Jersey herds with cows calving 1979-1989 and > 127,000 DHI records of cows calving during the same period in 12 states of the Southeastern U.S. were used to assess performance encompassing 24 measures (Table 3). The measures are sorted into those associated with yields and supportive traits. The latter are deemed as key factors in determining overall herd efficiency. For milk, fat and FCM, Jerseys of Zimbabwe average 27-28% below herds of Southeastern U.S. However, when we consider that Zimbabwe Jerseys are 20% smaller in size, their environments are more stressful and they have limits in being progeny of selected sires, performance is very good. A surprise is the similarity of the two locations in the overall phenotypic variance in milk yield, over 1.2 million kg^2, in contrast to only 250,000 kg^2 for native breeds and crossbreds about 450,000 kg^2. Heritability of milk yield is very close (38% Zimbabwe, U.S. 43%). Repeatability of records is high in Zimbabwe (64%). Collectively the traits indicate that progress toward increased milk yield of Jerseys can be obtained employing the usual selection procedures, whereas changes will be quite slow in Native and Crossbred groups. Of worthy note is the effectiveness of Zimbabwe breeders in keeping values for the supportive traits well above the average for countries of the WCZ. In fact the differences in performance between Zimbabwe and the U.S. herds do not likely exceed the variability among herds within each state of the Southeastern U.S.

We have more to come on identification of U.S. sires used in Zimbabwe but preliminary results on 11 U.S. origin sires shows their genetic merit is +94 kg in milk and 13 Zimbabwe bred bulls average -105 kg. Several studies on U.S. Holstein sires used in WCZ have shown

Table 3. Performance of Jerseys in Zimbabwe and the Southeastern U.S.

Traits	Zimbabwe	U.S.
Yields		
Milk per lactation (kg)	4,000	5,548
4% FCM (kg)	4,400	6,044
Fat yield (kg)	181	255
% fat	4.53	4.60
Milk/day calving interval (kg)	10	14
Milk/kg of body weight (kg)	10.8	11.7
Gain milk 1st to 2 d lact. (%)	8	7
Phenotypic variance milk yield (mil kg^2)[a]	1.2	1.2
Supportive traits		
Lactation length (d)	290	264
% lactations < 250d	13.7	27.5
Age at 1st calving (mo)	27	27
% calving 18-26 mo	54	44
% calving 27-30 mo	31	36
% calving ≥ 31 mo	15	20
Av. age all calvings (mo)	54	53
Days dry	85	73
Days open	121	96
Calving interval (d)	401	395
% days in milk	67	72
Milk credit/yr[b]	91	92
Month of calving effects on milk (%)	23	9
Heritability of milk yield (%)	.38	.43
Repeatability for milk yield (%)	.64	.53
Mature body weight (kg)	370	475

[a] Estimate of total phenotypic variation for milk yield.
[b] Lactation milk yield adjusted by ratio of lactating length to calving interval

that interaction effects of sire origin are low. This indicates that even though milk yields are lower in the WCZ, progeny of U.S. AI sires rank in the same order as in the U.S. We can therefore recommend use of the best sires from the U.S. as a suitable choice for use in the WCZ countries.

The Jersey breed is well qualified for use in WCZ countries, particularly when we can create herd environments to support milk yield >3,000 kg per lactation. Also, it is evident that research findings from the U.S. can be effective in breeding, feeding and management policies

for herds of the WCZ to include possible use of stimulants such as bST and rumensin.

Jerseys already play important roles in the dairy industries of Zimbabwe and Costa Rico. The breed is becoming important in Northern South Africa, the part in the WCZ. Populations are expanding in Ecuador, India, Pakistan and Saudi Arabia. Following our findings, U.S. Jersey breeders have the challenge of expanding use of the breed in countries of the WCZ.

ACKNOWLEDGEMENTS

The Investigators are most grateful to the Zimbabwe Herd Improvement Association (ZDHIA) and the USDA Animal Improvement Programs, Beltsville, Maryland for the records used. We are equally grateful to Dr. Tibbo and colleagues for free use of their review of 83 studies in support of our investigations and to AJCA for their financial support of our efforts.