

New Zealand Society of Animal Production online archive

This paper is from the New Zealand Society for Animal Production online archive. NZSAP holds a regular annual conference in June or July each year for the presentation of technical and applied topics in animal production. NZSAP plays an important role as a forum fostering research in all areas of animal production including production systems, nutrition, meat science, animal welfare, wool science, animal breeding and genetics.

An invitation is extended to all those involved in the field of animal production to apply for membership of the New Zealand Society of Animal Production at our website www.nzsap.org.nz

[View All Proceedings](#)

[Next Conference](#)

[Join NZSAP](#)

The New Zealand Society of Animal Production in publishing the conference proceedings is engaged in disseminating information, not rendering professional advice or services. The views expressed herein do not necessarily represent the views of the New Zealand Society of Animal Production and the New Zealand Society of Animal Production expressly disclaims any form of liability with respect to anything done or omitted to be done in reliance upon the contents of these proceedings.

This work is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](http://creativecommons.org/licenses/by-nc-nd/4.0/).



You are free to:

Share— copy and redistribute the material in any medium or format

Under the following terms:

Attribution — You must give [appropriate credit](#), provide a link to the license, and [indicate if changes were made](#). You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

NonCommercial — You may not use the material for [commercial purposes](#).

NoDerivatives — If you [remix, transform, or build upon](#) the material, you may not distribute the modified material.

<http://creativecommons.org.nz/licences/licences-explained/>

Characterisation of beef cattle breeding industry structure

P.L. CHARTERIS AND D.J. GARRICK

Department of Animal Science, Massey University, Palmerston North, New Zealand.

ABSTRACT

The structure of the beef cattle industry, from a breeding viewpoint is characterised by registered herds from which bulls are sold to: other registered breeders, commercial beef cattle farmers and dairy farmers. This project characterised New Zealand's beef industry in terms of numbers of commercial and registered cattle and the destination of genes (breeding vs. slaughter) transmitted from registered herds to commercial beef cattle and dairy herds.

Steers and heifers slaughtered at Manawatu Beef Packers (MBP) between March 1994 and April 1995 ($n=51,612$) were Angus (28%), Angus-cross (21%), Hereford (9%), Hereford x Friesian (8%) and Simmental-cross (7%). Due to misidentification of breed, cattle slaughtered at MBP may not be representative of the national beef cattle kill. Identified beef cattle breeds on 500 New Zealand Meat and Wool Boards' Economic Service Survey Farms in 1992/1993 were Angus (22%), Angus x Hereford (14%) and Hereford (13%).

An estimated 64,000 breeding cows were registered in New Zealand in 1995, comprising 20,000 Hereford (including Horned and Polled cattle), 18,000 Angus and 8,400 Simmental. Some 15,600 bulls would be sold annually from registered herds, including 4,200 Hereford, 2,600 Angus and 1,900 Simmental. Approximately 43,000 breeding bulls are used in the beef cattle industry each year. About 41% of Angus, 56% of Hereford and 11% of Simmental bulls are sold to dairy herds with 50, 45 and 70% of all female progeny of these bulls being slaughtered respectively. Determining how bulls are utilised in the commercial beef cattle industry is important in developing selection objectives for beef cattle and assessing potential beef industry benefit from selection.

Keywords: Beef cattle; industry structure; Angus; Hereford; Simmental.

INTRODUCTION

Genetic improvement provides potential to improve profitability of beef cattle farming in New Zealand. Most beef cattle are managed in commercial herds where bulls are purchased outside the herd and little or no individual recording is undertaken. A small proportion of beef cattle are located in registered herds where pedigree recording has been mandatory. These herds produce almost all of the bulls used in commercial herds. Accordingly, industry genetic change is dictated by the direction and rate of progress achieved in the registered herds. Genetic progress is achieved by choosing the better individuals to use as parents of the next generation. This requires definition of the attributes that constitute a better individual. From an industry viewpoint it is desirable to define attributes in terms of profitability of commercial beef cattle farming in New Zealand. Bulls can be used either as terminal sires with all progeny being slaughtered or used to produce replacement heifers with surplus heifers and male progeny being slaughtered. The relative importance of these two roles varies according to the breed of bull and the herd in which bulls are to be used. The aim of this study is to quantify breed composition in registered and commercial herds and to categorise roles of breeding bulls and their replacements.

METHODS

Commercial beef industry statistics

Numbers of cattle and their breed composition were obtained from the most recent national beef industry census

(Statistics New Zealand, 1987). Estimates of breed composition of commercial beef cattle herds were obtained from a survey of 500 farms undertaken by the New Zealand Meat and Wool Board's Economic Service (NZMWBES) in 1992/1993 (R. Davison, *personal communication*). Breed composition of cattle slaughtered at Manawatu Beef Packers were determined from 1994/1995 data (R. Forgie, *personal communication*). At this plant, breed of cattle is subjectively identified at the point of slaughter without farmer consultation.

Registered cattle statistics

Numbers of registered cattle herds were obtained from records provided by twenty beef cattle Breed Societies in August 1995. Information gathered included, for each breed, the numbers of currently registered cows and the annual recruitment of bull and heifer calves.

Artificial breeding using beef semen

Utilisation of beef semen was determined from insemination and sales figures provided by known artificial breeding companies (including Livestock Improvement Corporation, Ambreed, Nu-Horizon Genetics and Dalstud). Statistics from MAFQUAL were obtained to determine quantities of beef semen imported into New Zealand.

Bull usage in commercial herds

Numbers of bulls sold to commercial beef cattle and dairy farmers were determined from a survey sent to all registered Angus, Hereford and Simmental breeders. Breeders were asked to record the age, number and destination of

bulls sold in 1994. For each bull age and selling destination, breeders were asked to estimate the number of mating seasons for which bulls would be used and the proportion of female progeny retained as replacements (rather than slaughtered) for their bull buying customers.

Number of trait expressions

Numbers of calf and carcass trait expressions for progeny and grandprogeny of Angus, Hereford and Simmental bulls mated to dairy or beef herds were determined for each breed. Gene flows were assessed from patterns of bull usage (number of bull mating seasons and destination of female progeny) as determined by survey results. Counts of traits were expressed per bull lifetime and discounted to the birth date of the bull to account for time delays in trait expression (up to 10 years). A 2% discount rate was used.

RESULTS AND DISCUSSION

Commercial beef cattle in New Zealand

Beef breeding cows

The last national breed census was conducted in 1987 (Statistics New Zealand, 1987). Total numbers and predominant breeds of cattle reported in that census and the 1992/1993 NZMWBES survey are shown in Table 1.

TABLE 1: Breeds of cattle and breeding cows (Statistics New Zealand 1987; NZMWBES, unpublished).

Beef cattle breed	Percentage of beef cattle by breed		
	Statistics New Zealand (1987)	NZMWBES (unpublished)	
	Cows and heifers bred from	All cattle	All cattle
Angus	28.7	22.7	21.9
Angus x Hereford	18.5	17.7	13.5
Hereford	17.8	13.3	12.5
Friesian	2.7	10.7	10.9
Friesian x Hereford	1.9	3.3	0
Murray Grey	1.3	1.0	1.0
Shorthorn	1.0	1.2	1.0
Simmental	0.4	0.3	1.0
Mixed	18.2 ¹	18.2 ¹	35.4
Other	9.3	11.6	2.8
Total cattle	1,586,247	4,804,178	N/A

¹ Unspecified cattle, no breed reported on the census form or incomplete census form submitted

In 1987, Angus, Angus x Hereford and Hereford cattle comprised 65% of the national beef cow herd and 54% of total beef cattle (Statistics New Zealand, 1987). Based on the NZMWBES farm survey undertaken some five years later, the estimated proportion of Angus, Hereford and crosses was slightly lower at 48%. This lower proportion may have reflected sampling errors or a greater use of non-traditional beef breeds. Furthermore, a large proportion of beef cattle (35%) from the 1992/1993 survey were classified as mixed.

Cattle slaughtered

The breed composition of prime cattle slaughtered at Manawatu Beef Packers, (AFFCO, Feilding) during 1994/1995 is summarised in Table 2. The majority (68%) of prime steers slaughtered were British breeds or crosses between British breeds (such as Hereford x Angus), with 12% comprising Continental breeds or crosses between Continental and British breeds and 16% being dairy breeds or crosses between dairy and beef cattle breeds. A small percentage were identified as mixed (presumably unidentifiable) 4% or *Bos indicus* (<1%).

TABLE 2: Predominant Breed and breed crosses of steers and heifers processed at Manawatu Beef Packers (AFFCO, Feilding) in 1994/1995 (Forgie, unpublished).

	Percentage of prime steers	Percentage of prime heifers
Angus	28.7	21.0
Angus x	21.4	17.5
Hereford	9.2	6.9
Hereford x Friesian	8.5	7.4
Simmental x	7.1	10.6
Hereford x	4.6	7.4
Friesian	4.3	7.3
Mixed	4.2	4.8
Other	12.1	17.1
Total cattle	48,296	3,316

Angus, Angus-cross and Angus x Hereford comprised 59% of steers slaughtered at Manawatu Beef Packers during 1994/1995. The comparable figure from the 1992/1993 NZWBES survey indicated these breeds and their crosses comprised some 48% of total cattle. Explanation for these differences include breed misidentification at the slaughter plant, Manawatu Beef Packers preference for cattle that are likely to meet Japanese market specification or regional differences in breed composition.

Registered beef cattle herds in New Zealand

Breeding cows

In 1995 there were 2,100 herds, representing 300 Angus, 350 Hereford and 300 Simmental breeders. In the same year there were 64,000 registered beef cows in New Zealand, comprising 4.2% of the national beef cow herd of 1.52 million cows. Breed composition of registered beef cows is shown in Table 3.

Angus, Hereford and Simmental breeds together account for 45% of registered herds and 73% of registered cows. Assuming that beef cattle farmers primarily source bulls for breeding from registered herds, genetic change within commercial herds would be dictated by the direction and rate of genetic progress within Angus, Hereford and Simmental registered herds. In contrast, 1969 statistics reported only 11,000-12,000 registered cows representing 0.7% of the then national breeding herd of 1.78 million cows (Cairney and Magnusson, 1970). Change from 1969 to 1995 indicate at least a five-fold increase in numbers of registered cows over a 25 year time frame

TABLE 3: Numbers and percentage of registered cows by breed in New Zealand in 1995.

Breed	Number of registered cows	Percentage of registered cows
Angus	18,000	28.1
Hereford	20,000	31.3
Simmental	8,400	13.1
South Devon	4,200	6.6
Charolais	3,800	5.9
Limousin	2,929	4.6
Murray Grey	2,200	3.4
Beef Shorthorn	2,080	3.3
Other	2,391	3.7
Total registered cows	64,000	

despite a decrease in the national herd and an increased use of artificial insemination. This increase in numbers cannot be accounted for by the growth of new breeds as Angus and Hereford registrations alone account for 38,000 cows in 1995.

Beef semen usage

Some 165,000 beef inseminations were recorded in dairy herds in 1994/1995 including 50% Polled Hereford, 8% Hereford, 8% Belgian Blue, 6% Angus and 5% Wagyu (Livestock Improvement Corporation and Ambreed, unpublished). No other breed accounted for more than 5% of total inseminations. Approximately 25,000–30,000 inseminations of beef semen were used within beef cattle herds in 1995. These inseminations include locally produced and imported beef semen. The majority of straws of beef semen imported in 1994/1995 ($n = 53,000$ straws) were from Wagyu (46%), followed by Angus (10%) and Hereford (8%) breeds. Imported beef semen originated from the United States (44%), Australia (34%) and Canada (15%) (MAFQUAL unpublished).

Bull sales

Given a registered beef breeding herd of 64,000 cows, approximately 15,600 new bulls would be available for sale to commercial farmers annually (accounting for bulls required within registered herds and assuming that 40% of yearling bulls are unsatisfactory for sale purposes). If the bull culling rate was reduced to 35% or increased to 45%, the number of bulls available for sale annually would change to 16,900 and 14,200 bulls respectively.

Survey responses were received from 53 Angus, 78 Hereford and 45 Simmental breeders, representing 1,848, 1,898 and 621 bulls sales respectively. Respondents represented 18% of Angus, 22% of Hereford and 15% of

Simmental breeders but 42%, 39% and 30% of bull sales respectively. It is recognised that respondents do not represent a random sample of breeders but nevertheless they do represent a sizeable proportion of bull sellers.

Sale destination for yearling and two year old bulls to dairy and beef cattle farmers are shown by breed in Table 4. Dairy herd destinations account for a major proportion of bull sales, particularly for Hereford (56%) and to a lesser extent for Angus (41%). Simmental breeders sold only a small proportion (11%) of their bulls to dairy farmers. Sales of yearling bulls accounted for 34% (Angus), 47% (Hereford) and 16% (Simmental) sales. Breeders comment that these bull sales (especially to dairy farmers) tend to be at lower prices than 2 year old bull sales and include bulls that are not considered worthy of retention through to sale at 2 years of age. In contrast, beef cattle farmers primarily bought two-year old bulls.

Number of progeny trait expressions

Breeder assessment of the destination of daughters produced from dairy cows indicated that 85% of daughters of Angus and Hereford bulls and 100% of female progeny of Simmental bulls would be slaughtered (as opposed to being retained for breeding). In contrast, when bulls are bought by commercial beef cattle farmers, 45–50% of female progeny of Angus and Hereford bulls and 70% of daughters of Simmental bulls were believed to be slaughtered. These results imply a terminal sire role of Simmental bulls within both beef and dairy herds.

Breeders assessed their Angus, Hereford and Simmental bulls were used for an average of 1.7, 2.0 and 2.7 years when sold to dairy farmers. Bulls were used longer within beef herds with breeders assessments of 4, 3.7 and 4 years when Angus, Hereford and Simmental bulls were used within beef herds respectively.

The number of expressions of calf and carcass traits from progeny of Angus, Hereford and Simmental bulls over their lifetime were calculated for each farm type. These counts were summed and weighted by a discount factor accounting for their time of expression. The number of cumulative discounted expressions are shown in Table 5.

Number of cumulative discounted expressions was higher for bulls used within beef than for dairy herds due to a higher heifer retention rate within beef herds and greater number of bull mating seasons. Differences in heifer retention rate also accounted for more discounted expressions in Angus and Hereford breeds compared to the Simmental breed. A higher ratio of carcass traits compared with calf traits expressed was found for progeny of Simmental bulls than for progeny of the other two breeds.

TABLE 4: Sale destination by breed and bull age for Angus, Hereford and Simmental bulls.

% of bulls sold	Bull breed	Yearling bulls		2 Year old bulls		Older bulls
		To beef cattle farmers	To dairy farmers	To beef cattle farmers	To dairy farmers	To all farmers
	Angus	6.3	27.9	51.4	12.8	1.6
	Hereford	2.0	45.4	41.5	10.8	0.3
	Simmental	7.9	7.6	78.3	3.4	2.8

TABLE 5: Number of cumulative discounted expressions of calf and carcass traits when Angus, Hereford or Simmental bulls are used within dairy or beef herds.

Bull selling destination	Breed	Cumulative discounted expressions		
		Calf traits (Discounted calves at weaning) ¹	Carcass traits (Discounted carcasses at slaughter) ¹	Ratio, carcass traits to calf traits
Dairy herds	Angus	63.8	53.5	0.84
	Hereford	56.4	46.3	0.82
	Simmental	43.4	41.2	0.95
Beef herds	Angus	104.3	82.1	0.79
	Hereford	94.4	81.6	0.86
	Simmental	87.5	76.5	0.87
Pooled ²	Angus	87.8	70.4	0.80
	Hereford	73.0	56.0	0.77
	Simmental	82.6	72.6	0.88

¹ Counts of traits have been discounted at 2% to the bulls birth year.

² These values weight the results for each destination (dairy or beef herds) by the proportion of bulls used.

SUMMARY

Angus, Hereford and Simmental are the predominant beef cattle breeds within the registered beef cattle population. The pattern of gene transfer from registered to commercial sectors of the industry (based on bull sale destination and proportion of heifer progeny retained for breeding) differs between these three breeds. Selection objectives aimed at improving profitability of commercial farmers should account for different patterns of bull use and would therefore place different emphasis on carcass compared to calf traits in each of these three breeds.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge funding for this project is provided by the New Zealand Meat Research and Development Council (MRDC) and co-operation provided by respective Breed Societies and their members.

REFERENCES

Cairney, I.M.; Magnusson, R.E. 1970. The structure of the beef breeding industry and the role of the national recording scheme. Pp 89-100. *in*: Campbell, A.G. ed. (1970). *New Zealand Beef: Production, Processing and Marketing*. New Zealand Institute of Agricultural Science.

Statistics New Zealand, 1987. *New Zealand beef cattle by breed as at 30 June, 1987*. p 106.