

4. Herd improvement

A. Use of herd testing

Herd testing enables farmers to collect information about individual cows in their herds. The information gained from herd testing is vital for effective herd management and decision making. Farmers are able to benchmark animal performance within herd, within region, and nationally.

Farmers had the choice of two herd testing service providers in 2004/05 (Ambreed and Livestock Improvement) and were able to choose the frequency of testing.

Herd testing involves the collection of individual milk samples from every milking animal in the herd. A full herd test provides information on milk volumes, milkfat and protein yields, and somatic cell counts. However, herd testing may also be limited to specific purposes such as measuring milk volumes or somatic cell counts.

Information from herd testing cannot be gained in any other way. Herd test information identifies low producing cows (for culling or drying off), high producers (for breeding), and cows with mastitis (for therapy or culling). Herd testing also provides an overall picture of the production of the herd, and enables the mastitis status to be monitored.

The regions in Chapter 4 refer to areas used by Livestock Improvement Corporation (LIC). Appendix 1 shows a list of districts included in each region.

- **76% of herds undertake herd testing in 2004/05**

The percentage of total herds using herd testing decreased slightly to 75.8% in 2004/05 (Table 4.1). This figure is down 11.3% from the highest percentage of herd testing set in 1996/97. Although there are a record number of cows (3.87 million), fewer were tested (2.81 million) compared with last season (2.84 million). The percentage of total cows tested (72.7%) continues to decline steadily from a peak of 89.6% reached in 1996/97.

16

Table 4.1 **Trend in the use of herd testing services for the last 20 seasons**

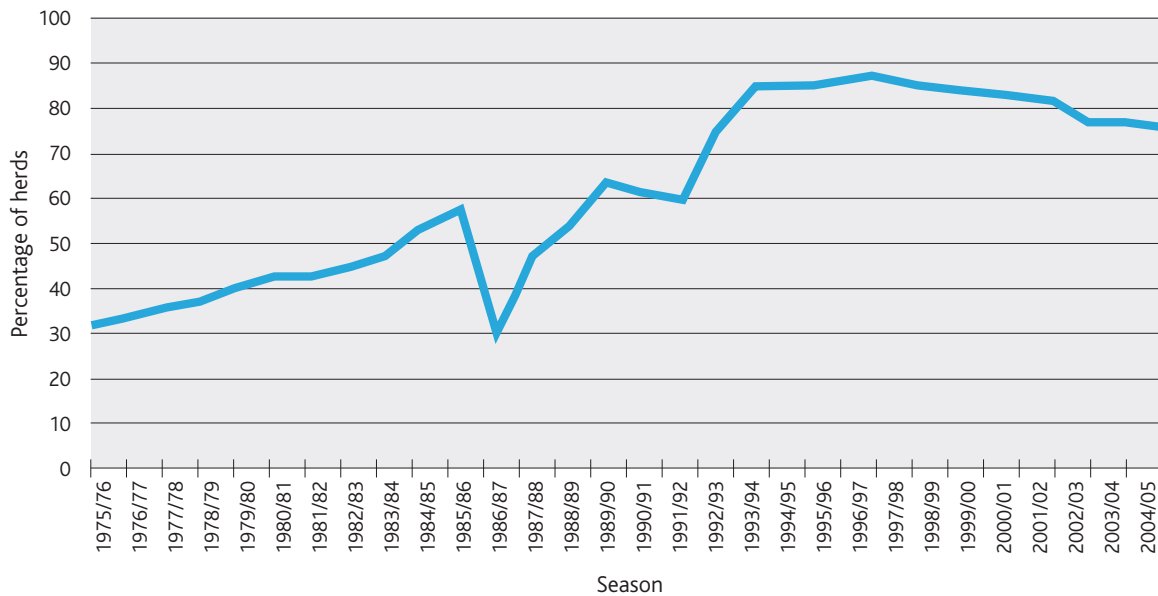
Season	Number of herds	% of total herds	Number of cows (000)	% of total cows	Total herds	Total cows
1984/85	8,445	53.2	1,294	56.7	15,881	2,280,273
1985/86	9,026	57.3	1,484	63.9	15,753	2,321,012
1986/87	4,555	29.7	753	33.0	15,315	2,281,849
1987/88	6,930	46.8	1,175	52.5	14,818	2,236,290
1988/89	7,932	53.8	1,341	59.1	14,744	2,269,073
1989/90	9,213	63.1	1,604	69.3	14,595	2,313,822
1990/91	8,918	60.7	1,566	65.2	14,685	2,402,145
1991/92	8,661	59.9	1,611	66.1	14,452	2,438,641
1992/93	10,843	75.0	2,039	78.3	14,458	2,603,049
1993/94	12,372	84.8	2,377	86.9	14,597	2,736,452
1994/95	12,446	85.0	2,474	87.4	14,649	2,830,977
1995/96	12,620	85.6	2,592	88.3	14,736	2,935,759
1996/97	12,851	87.2	2,746	89.6	14,741	3,064,523
1997/98	12,510	85.3	2,826	87.7	14,673	3,222,591
1998/99	12,059	84.0	2,819	85.7	14,362	3,289,319
1999/00	11,521	83.1	2,806	85.8	13,861	3,269,362
2000/01	11,472	82.6	2,942	84.4	13,892	3,485,883
2001/02	11,113	81.4	2,974	80.5	13,649	3,692,703
2002/03	10,113	77.0	2,855	76.3	13,140	3,740,637
2003/04	9,772	76.6	2,842	73.8	12,751	3,851,302
2004/05	9,306	75.8	2,811	72.7	12,271	3,867,659



Herd improvement – Use of herd testing

The trend in the percentage of total herds using herd testing continues to decrease from the peak reached in the 1996/97 season (Graph 4.1).

Graph 4.1 *Trend in the percentage of herds testing for the last 30 seasons*



The regional uptake of herd testing services in 2004/05 is shown in Table 4.2, where the number of cows tested refers to all cows tested at least once in the season. Taranaki had the highest percentage of herds using herd testing (79.8%) and also reported the highest percentage of cows herd testing (78.6%).

Table 4.2 *Use of herd testing by LIC region in 2004/05*

Livestock Improvement Region	Herds tested	Total herds	% of total herds	Cows tested	Total cows	% of total cows	Average herd size tested	Average herd size
Northland	960	1,324	72.5	238,545	330,595	72.2	248	250
Auckland	3,631	4,831	75.2	1,010,976	1,403,410	72.0	278	291
Bay of Plenty/East Coast	505	657	76.9	141,899	191,887	73.9	281	292
Taranaki	1,607	2,015	79.8	388,950	494,826	78.6	242	246
Wellington/Hawkes Bay	897	1,183	75.8	271,001	383,472	70.7	302	324
South Island	1,706	2,261	75.5	759,157	1,063,469	71.4	445	470
New Zealand	9,306	12,271	75.8	2,810,528	3,867,659	72.7	302	315

Note: Table includes figures from both herd test providers



B. Herd test averages

The lactation yield figures in this section are for cows herd tested. Season and breed averages (parts i and iii) are calculated on lactation yields for herds tested four or more times during the season. Monthly averages (part ii) are calculated on lactation yields for herds tested at least once during the season, and only cows that lactated for one hundred days or more were included in herd test averages. In comparison, the average milksolids figures given in Chapters 2 and 3 (national and regional dairy statistics respectively) are based on all herds supplying a dairy company, regardless of whether herd testing was used, and represent the average production per cow as supplied to the dairy company. Therefore, production figures reported using each of these methods will differ.

Days-in-milk (herd testing) information is the number of days from the start of lactation to the calculated end of lactation. The start of lactation is four days from calving (with a maximum of 60 days between the estimated start of lactation and the first herd test). The end of lactation is the last herd test date plus 15 days. The inclusion of herds with fewer than four tests reduces the calculated average lactation length. Therefore, the number of days in milk does not necessarily reflect the average lactation length of dairy cows.

The days-in-milk (production) figure is the number of days from the estimated start of lactation to the estimated end of lactation (reported since 1997/98). The results are derived from seasonal supplier tanker pick-up information adjusted for calving spread. The days-in-milk (production) methodology provides a more accurate measure of the average lactation length of dairy cows than days-in-milk (herd testing).

i) Season averages

- *South Island has the highest herd test production (kg)*
- *Taranaki has the highest milkfat, protein and milksolids percentages*

Average per cow statistics for each Livestock Improvement (LIC) region is summarised in Table 4.3. The days-in-milk figure derived from tanker pick-up dates (production) more accurately reflects the lactation length than does the days-in-milk figure derived from herd tests and calving dates (herd testing).

The South Island recorded the highest per cow milk volume (4,326 litres), milkfat (202 kg) and protein (159 kg) of cows herd tested. Taranaki recorded the highest percentages for milkfat (5.12%), protein (3.85%) and milksolids (8.97%).

18

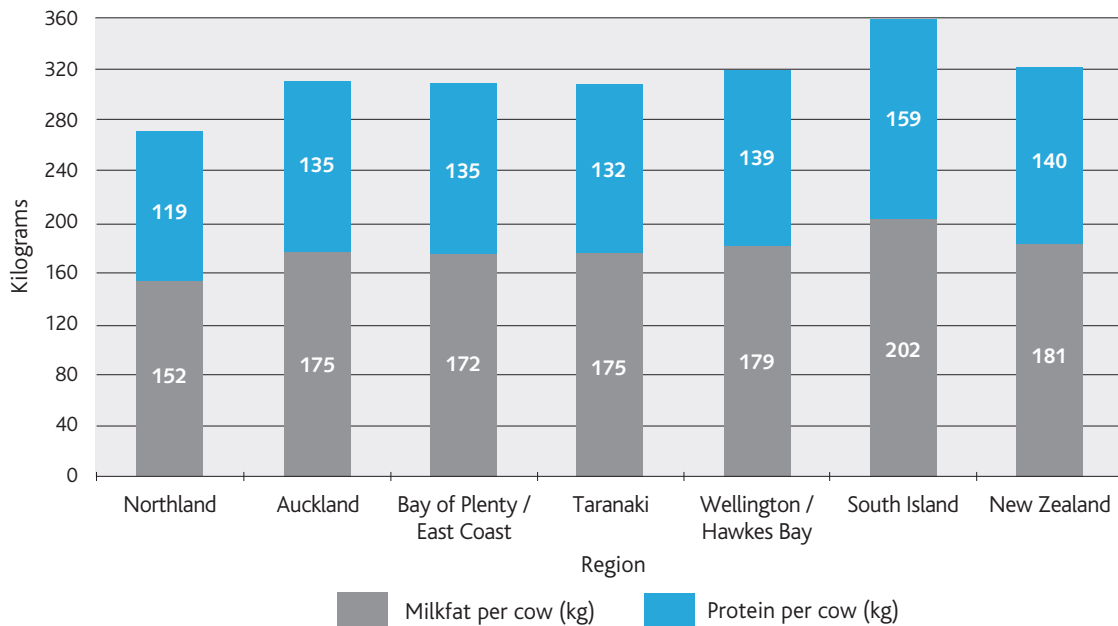
Table 4.3 *Season herd test averages per cow by LIC region in 2004/05*

Livestock Improvement Region	Milk (litres)	Milkfat (kg)	Milkfat (%)	Protein (kg)	Protein (%)	Milksolids (kg)	Milksolids (%)	Days in milk (herd testing)	Days in milk (production)	Somatic cell count (000 cells/millilitre)
Northland	3,297	152	4.57	119	3.55	271	8.22	216	257	227
Auckland	3,693	175	4.74	135	3.62	310	8.39	224	264	220
Bay of Plenty / East Coast	3,775	172	4.59	135	3.58	307	8.13	223	265	244
Taranaki	3,422	175	5.12	132	3.85	307	8.97	228	267	227
Wellington / Hawkes Bay	3,807	179	4.70	139	3.62	318	8.35	227	274	262
South Island	4,326	202	4.68	159	3.68	361	8.35	226	266	244
New Zealand	3,812	181	4.75	140	3.66	321	8.42	225	265	229

The 2004/05 milkfat and protein lactation regional averages of herd tested cows (Graph 4.2) show some variability in values between all regions, with milkfat production ranging from 152 (Northland) to 202 kg per cow (South Island) and protein production from 119 (Northland) to 159 kg per cow (South Island).



Graph 4.2 Average milkfat and protein production per cow in 2004/05



• **Decrease in production per cow (kg) for 2004/05**

In 2004/05, average milk volume, milkfat, and protein has seen a slight decline from the 2003/04 figures (Table 4.4). The last twenty years have seen a general trend of increasing production in both milk volume and milksolids. However, in individual years this trend can be masked by other factors, in particular, weather conditions. The 1998/99 season recorded 260kg milksolids per cow, the lowest in more than 10 years.

The sharp decrease in the average somatic cell count per millilitre of milk from 1993/94 onwards compared with the seasons prior to 1993/94, as shown in Table 4.4, is due to a number of factors, including industry pressure for improved milk quality and farm management practice. However, a consistent trend upwards has appeared over the last several seasons.

Table 4.4 Trend in the national herd test averages for the last 20 seasons

Season	Milk (litres)	Milkfat (kg)	Milkfat (%)	Protein (kg)	Protein (%)	Milksolids (kg)	Milksolids (%)	Days in milk (herd testing)	Days in milk (production)	Somatic cell count (000 cells/ millilitre)
1985/86	3,424	161	4.78	–	–	–	–	247	–	–
1986/87	3,046	143	4.79	–	–	–	–	230	–	–
1987/88	3,300	156	4.81	–	–	–	–	235	–	–
1988/89	3,197	149	4.67	115	3.60	264	8.26	237	–	265
1989/90	3,221	152	4.72	117	3.66	269	8.35	235	–	358
1990/91	3,190	152	4.81	116	3.65	268	8.40	222	–	298
1991/92	3,361	162	4.83	124	3.70	286	8.51	226	–	282
1992/93	3,298	157	4.77	121	3.65	278	8.43	221	–	280
1993/94	3,560	171	4.84	131	3.69	302	8.48	223	–	216
1994/95	3,253	154	4.77	118	3.64	272	8.36	208	–	206
1995/96	3,501	164	4.72	126	3.60	290	8.28	224	–	206
1996/97	3,641	173	4.78	133	3.66	306	8.40	223	–	197
1997/98	3,373	158	4.67	119	3.52	277	8.21	209	266	195
1998/99	3,189	147	4.51	113	3.44	260	8.15	208	266	200
1999/00	3,601	169	4.69	130	3.58	299	8.30	221	263	193
2000/01	3,706	173	4.68	134	3.59	307	8.28	224	268	196
2001/02	3,791	176	4.64	138	3.61	314	8.28	227	268 ^a	210
2002/03	3,736	175	4.68	138	3.66	313	8.38	219	–	213
2003/04	3,871	184	4.75	142	3.64	326	8.42	224	265	220
2004/05	3,812	181	4.75	140	3.66	321	8.42	225	265	229

^a Average excludes Northland, Taranaki and Wellington/Hawkes Bay



ii) Monthly averages

- *Highest average production per cow per day occurred in October*

The seasonal average figures presented in Table 4.5 are calculated using national monthly herd test averages, and are therefore affected by the number of samples processed. Statistics for May, June and July are based on far fewer cows than the statistics for other months, as only a few herds (generally winter milk herds) test in these months. Differences in climate between regions, which in turn can affect the mating period, available feed and cow condition, are illustrated by differing months of peak production.

Before September 1998, monthly herd test averages included all herds scheduled for four or more tests during the season. After this time all cows herd tested in each month were included, provided they were tested once or more during the season (Table 4.5).

Table 4.5 *Monthly herd test averages by LIC region in 2004/05*

Average litres of milk per cow per day

Livestock Improvement Region	2004							2005					Season average
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	
Northland	14.50	14.15	16.57	18.66	18.31	16.69	14.80	14.22	12.23	9.54	7.55	11.42	14.51
Auckland	17.59	16.41	19.04	20.31	20.43	18.37	16.78	15.89	13.35	10.06	9.43	10.79	15.82
BOP / East Coast	16.48	14.58	20.25	20.55	21.07	19.05	17.86	15.97	13.83	10.76	9.95	10.96	16.17
Taranaki	17.48	12.89	18.29	18.37	18.62	17.09	15.00	14.45	12.54	10.16	9.19	9.16	14.39
Wgtn / Hawkes Bay	15.82	16.43	17.15	19.94	20.06	19.19	17.03	16.09	14.29	11.59	11.51	11.90	15.97
South Island	18.33	18.58	19.74	23.35	23.89	22.17	19.28	18.26	16.39	14.68	12.43	11.62	18.12
New Zealand	16.41	16.37	18.50	20.32	21.15	18.96	17.34	15.99	14.19	11.26	10.66	11.31	16.17

Average kg of milkfat per cow per day

Livestock Improvement Region	2004							2005					Season average
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	
Northland	0.64	0.64	0.74	0.83	0.83	0.75	0.67	0.68	0.59	0.50	0.41	0.54	0.68
Auckland	0.78	0.72	0.88	0.93	0.93	0.85	0.79	0.77	0.65	0.54	0.53	0.57	0.76
BOP / East Coast	0.71	0.63	0.88	0.90	0.93	0.84	0.80	0.74	0.65	0.55	0.53	0.53	0.74
Taranaki	0.85	0.66	0.88	0.89	0.89	0.85	0.76	0.76	0.67	0.59	0.56	0.54	0.74
Wgtn / Hawkes Bay	0.72	0.77	0.79	0.90	0.90	0.87	0.80	0.77	0.69	0.61	0.62	0.64	0.76
South Island	0.82	0.81	0.89	1.05	1.05	1.00	0.90	0.85	0.78	0.74	0.67	0.64	0.86
New Zealand	0.74	0.74	0.85	0.93	0.95	0.87	0.82	0.77	0.69	0.60	0.59	0.62	0.77

Average kg of protein per cow per day

Livestock Improvement Region	2004							2005					Season average
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	
Northland	0.50	0.51	0.59	0.67	0.66	0.60	0.53	0.52	0.45	0.37	0.30	0.41	0.53
Auckland	0.60	0.58	0.68	0.72	0.74	0.66	0.61	0.59	0.49	0.39	0.39	0.43	0.58
BOP / East Coast	0.55	0.52	0.70	0.72	0.75	0.67	0.63	0.58	0.49	0.41	0.40	0.42	0.58
Taranaki	0.62	0.49	0.67	0.67	0.70	0.66	0.58	0.57	0.49	0.42	0.40	0.40	0.56
Wgtn / Hawkes Bay	0.56	0.59	0.61	0.70	0.72	0.69	0.62	0.60	0.52	0.45	0.47	0.48	0.59
South Island	0.64	0.63	0.68	0.83	0.86	0.79	0.70	0.67	0.61	0.57	0.52	0.49	0.67
New Zealand	0.57	0.58	0.66	0.73	0.77	0.69	0.63	0.60	0.52	0.44	0.44	0.47	0.60

Average somatic cell count (000 cells per millilitre)

Livestock Improvement Region	2004							2005					Season average
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	
Northland	231	259	186	183	190	187	196	224	248	275	393	310	227
Auckland	272	246	205	188	186	176	183	195	227	271	298	299	220
BOP / East Coast	242	237	275	222	214	209	211	228	256	281	322	319	244
Taranaki	307	256	236	195	206	185	179	201	224	238	258	285	227
Wgtn / Hawkes Bay	255	271	286	267	255	231	222	245	263	287	281	311	262
South Island	249	253	280	250	229	212	213	236	243	248	256	284	244
New Zealand	252	256	222	206	207	191	196	212	236	264	285	294	229



iii) Breed averages

- *Holstein-Friesian cows show highest milksolids (kg) production*

Herd test statistics by breed (Table 4.6) include cows herd tested four or more times during the season.

On average, Holstein-Friesian/Jersey Crossbreed cows produced more milkfat than the other breeds listed, while Holstein-Friesian cows produced more protein and a higher volume of milk. Jerseys have the highest milkfat and protein percentages. In the Holstein-Friesian breed, six-year-old cows produced more milk, and five-year-olds more milksolids than any other age group. Five-year-olds dominated production for Jerseys and Holstein-Friesian/Jersey Crossbreeds, while six-year-olds had the highest production for Ayrshires.

A crossbreed is defined as having at most 13/16 of any one breed. For example, a Holstein-Friesian/Jersey Crossbreed may be 13/16 Holstein-Friesian, 2/16 Jersey and 1/16 Ayrshire.

Table 4.6 *Herd test breed averages by age of cow in 2004/05*

Holstein-Friesian

Age	Number	Days in milk	Milk (litres)	Milkfat (kg)	Protein (kg)	Milksolids (kg)	Milkfat (%)	Protein (%)	Milksolids (%)
2	193,034	224	3,348	148.6	117.9	266.5	4.48	3.54	8.02
3	177,218	219	3,877	172.7	138.3	311.0	4.50	3.58	8.08
4	147,692	220	4,357	189.3	154.0	343.3	4.38	3.55	7.93
5	122,078	220	4,503	193.2	158.6	351.7	4.33	3.54	7.87
6	106,507	218	4,506	193.3	158.1	351.3	4.32	3.52	7.84
7	89,957	218	4,425	193.3	155.9	349.3	4.40	3.54	7.94
8	72,163	216	4,397	190.8	152.9	343.7	4.37	3.49	7.86
9	55,004	214	4,190	185.4	146.7	332.1	4.45	3.51	7.96
10+	70,962	209	3,861	168.2	133.5	301.7	4.38	3.47	7.85
Total	1,034,615	219	4,085	178.5	143.8	322.4	4.41	3.54	7.95

Jersey

Age	Number	Days in milk	Milk (litres)	Milkfat (kg)	Protein (kg)	Milksolids (kg)	Milkfat (%)	Protein (%)	Milksolids (%)
2	71,101	227	2,442	139.9	98.1	238.0	5.76	4.03	9.79
3	63,259	223	2,787	161.7	114.4	276.0	5.83	4.12	9.95
4	54,887	224	3,073	177.1	126.2	303.2	5.79	4.12	9.91
5	45,716	224	3,136	181.8	129.8	311.6	5.82	4.15	9.97
6	38,246	223	3,051	178.2	127.1	305.2	5.87	4.18	10.05
7	32,306	222	3,056	176.5	126.7	303.1	5.80	4.16	9.96
8	22,371	219	3,002	170.9	123.8	294.7	5.71	4.13	9.84
9	15,327	217	2,953	168.1	121.0	289.1	5.72	4.11	9.83
10+	19,343	211	2,777	155.3	112.0	267.3	5.61	4.05	9.66
Total	362,556	223	2,878	165.8	118.1	283.9	5.79	4.11	9.90

Holstein-Friesian/Jersey crossbreed

Age	Number	Days in milk	Milk (litres)	Milkfat (kg)	Protein (kg)	Milksolids (kg)	Milkfat (%)	Protein (%)	Milksolids (%)
2	155,530	227	3,050	153.2	114.4	267.6	5.07	3.77	8.84
3	132,412	222	3,534	178.0	134.7	312.7	5.08	3.83	8.91
4	106,051	223	3,918	195.4	148.8	344.2	5.04	3.82	8.86
5	83,524	223	3,999	200.0	152.6	352.5	5.05	3.84	8.89
6	67,405	221	3,944	198.0	150.5	348.5	5.07	3.84	8.91
7	58,314	221	3,920	196.8	149.7	346.5	5.06	3.84	8.90
8	33,257	218	3,913	191.9	146.5	338.4	4.95	3.77	8.72
9	23,383	216	3,802	187.8	142.2	330.0	4.98	3.76	8.74
10+	31,934	212	3,561	171.8	130.9	302.7	4.86	3.69	8.55
Total	691,810	222	3,641	182.0	137.9	319.9	5.05	3.81	8.86



Herd improvement – Herd test averages – Breed averages

Ayrshire

Age	Number	Days in milk	Milk (litres)	Milkfat (kg)	Protein (kg)	Milksolids (kg)	Milkfat (%)	Protein (%)	Milksolids (%)
2	4,307	230	2,983	132.6	106.1	238.7	4.47	3.57	8.04
3	3,866	225	3,393	149.7	122.4	272.1	4.43	3.61	8.04
4	3,209	224	3,753	165.1	135.5	300.5	4.43	3.62	8.05
5	2,759	225	3,921	171.5	141.0	312.5	4.40	3.61	8.01
6	2,456	224	3,977	171.9	142.8	314.7	4.35	3.60	7.95
7	2,061	224	3,961	172.1	142.0	314.1	4.37	3.59	7.96
8	1,694	222	3,870	167.4	137.8	305.2	4.35	3.57	7.92
9	1,250	221	3,840	164.6	136.2	300.7	4.31	3.55	7.86
10+	1,738	214	3,560	151.2	125.1	276.4	4.26	3.52	7.78
Total	23,340	224	3,612	157.7	129.3	287.1	4.40	3.59	7.99

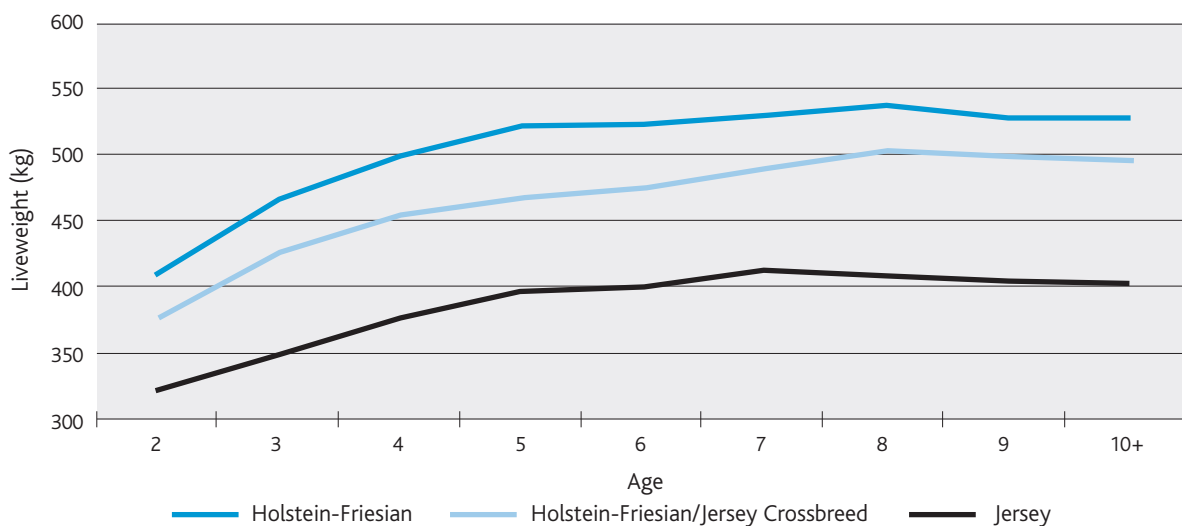
Holstein-Friesians have the highest average liveweight across all ages for the breeds shown in Table 4.7. In contrast, Jerseys have the lowest average liveweight for all ages. Liveweight by age and breed is illustrated in Graph 4.3.

Table 4.7 Liveweight by age and breed of cow in 2004/05

Age	Holstein-Friesian		Jersey		Holstein-Friesian/Jersey	
	Average liveweight (kg)	Number of cows	Average liveweight (kg)	Number of cows	Average liveweight (kg)	Number of cows
2	409	10,828	322	3,614	376	11,144
3	467	969	350	343	427	782
4	499	700	377	281	453	468
5	522	617	398	180	467	469
6	522	369	400	172	475	293
7	528	395	413	162	488	255
8	535	265	409	89	503	150
9	528	189	405	67	498	124
10+	527	248	403	58	495	194
Total	490		374		443	

22

Graph 4.3 Liveweight by age and breed of cow in 2004/05



C. Artificial Breeding statistics

- *South Island is the only region with an increase in the number of cows to AB for 2004/05*

All artificial inseminations are recorded on the Livestock Improvement Database. Table 4.8 provides a summary of cows mated to artificial breeding (AB) for the last nine seasons. This is the third consecutive season since 1993/94 where the percentage of cows to AB is below the 80% mark (Graph 4.4). The number of yearlings to AB is similar to that of the previous season (Table 4.8).

Table 4.8 *Trend in Artificial Breeding use for the last 9 seasons by LIC region: cows and yearlings to AB*

Cows to AB

Livestock Improvement Region	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05
Northland	262,429	258,057	244,115	246,617	257,752	261,197	228,988	218,488	212,210
Auckland	1,065,624	1,069,038	1,066,442	1,057,618	1,096,379	1,089,655	1,030,788	1,025,071	1,019,596
BOP / East Coast	155,267	156,602	153,294	152,751	157,162	154,762	147,047	145,464	140,493
Taranaki	399,435	404,930	395,636	405,605	427,683	423,723	400,322	398,794	388,277
Wellington / Hawkes Bay	254,002	266,514	266,171	276,517	294,387	302,349	291,188	281,448	279,240
South Island	437,078	483,968	510,514	587,957	660,075	756,874	769,954	817,952	829,141
New Zealand	2,573,835	2,639,109	2,636,172	2,727,065	2,893,438	2,988,560	2,868,287	2,887,217	2,868,957

% Cows to AB

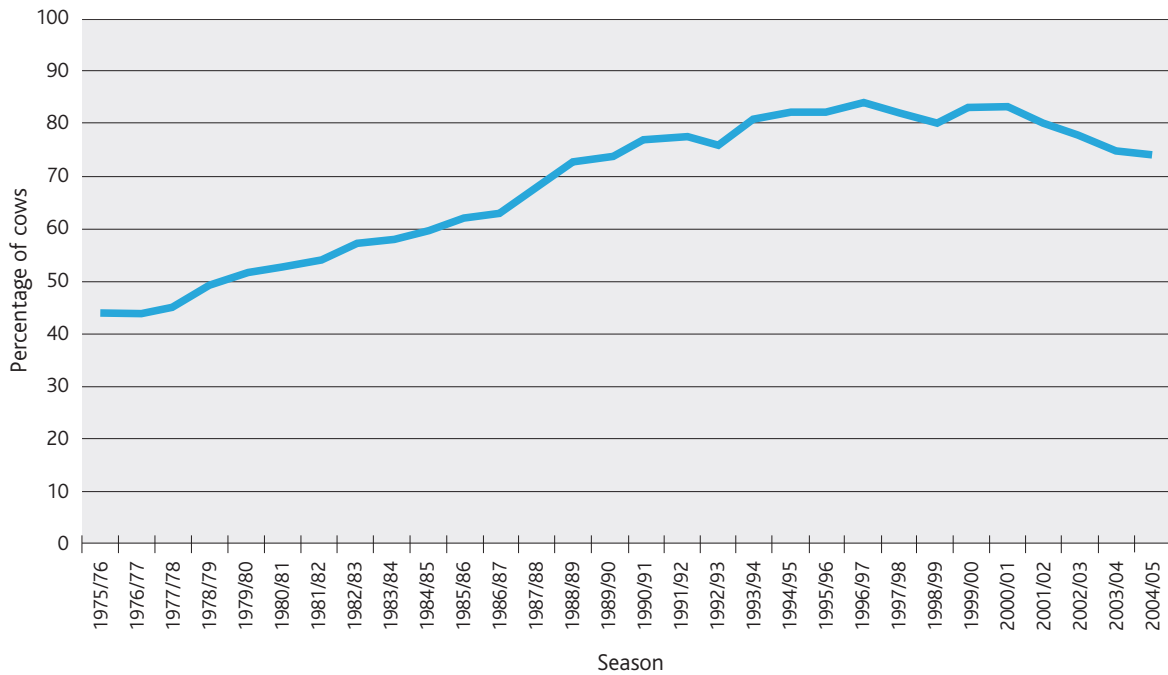
Livestock Improvement Region	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05
Northland	81.0	83.1	71.0	69.5	76.4	74.4	66.3	64.3	64.2
Auckland	86.2	82.8	84.7	79.6	92.9	78.8	74.7	72.7	72.7
BOP / East Coast	81.6	84.8	80.7	81.6	85.2	81.8	77.9	74.8	73.2
Taranaki	89.8	84.4	82.2	81.8	88.7	84.6	82.7	80.5	78.5
Wellington / Hawkes Bay	78.8	80.7	76.9	74.2	81.5	79.3	76.1	72.6	72.8
South Island	79.8	77.3	76.3	78.7	91.2	85.2	80.3	79.8	78.0
New Zealand	84.0	81.9	80.1	78.2	88.5	80.9	76.7	75.0	74.2

Yearlings to AB

Livestock Improvement Region	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05
Northland	20,613	15,966	11,188	9,825	10,437	10,942	7,982	7,765	7,428
Auckland	48,291	31,102	25,968	21,804	24,543	24,988	20,143	17,264	17,275
BOP / East Coast	15,753	10,317	7,854	7,250	8,492	8,929	6,763	4,691	5,014
Taranaki	11,909	8,428	5,748	5,700	7,698	7,528	8,220	3,703	3,268
Wellington / Hawkes Bay	14,375	9,887	6,223	6,313	7,823	7,517	5,948	5,076	5,960
South Island	54,152	35,159	34,906	41,469	56,743	55,680	47,162	39,401	40,019
New Zealand	165,093	110,859	91,887	92,361	115,736	115,584	96,218	77,900	78,964

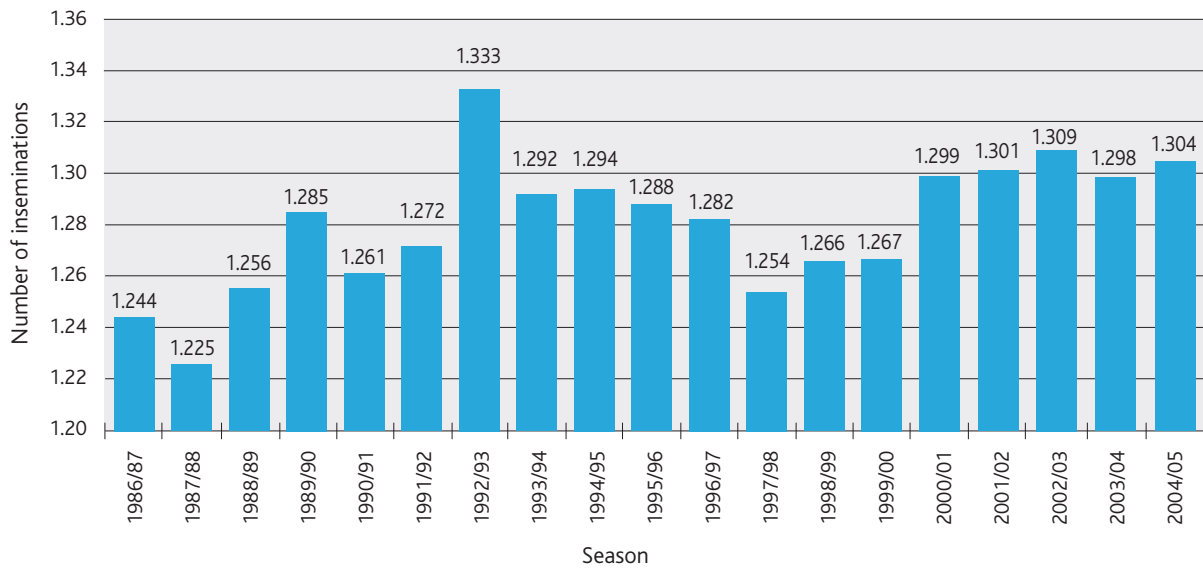


Graph 4.4 *Trend in the percentage of cows to Artificial Breeding for the last 30 seasons*



In 2004/05 the average number of inseminations per cow (1.30) as recorded on the Livestock Improvement Database, was similar to previous seasons (Graph 4.5).

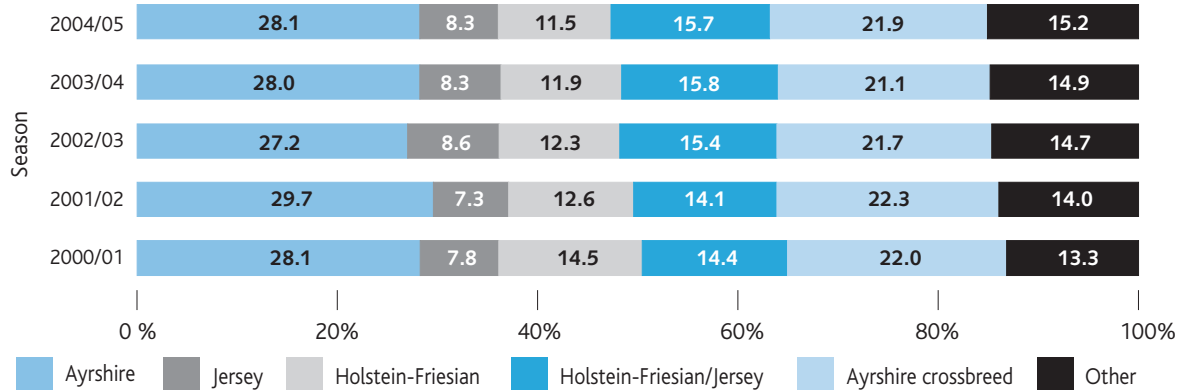
Graph 4.5 *Average number of inseminations per cow since 1986/87*



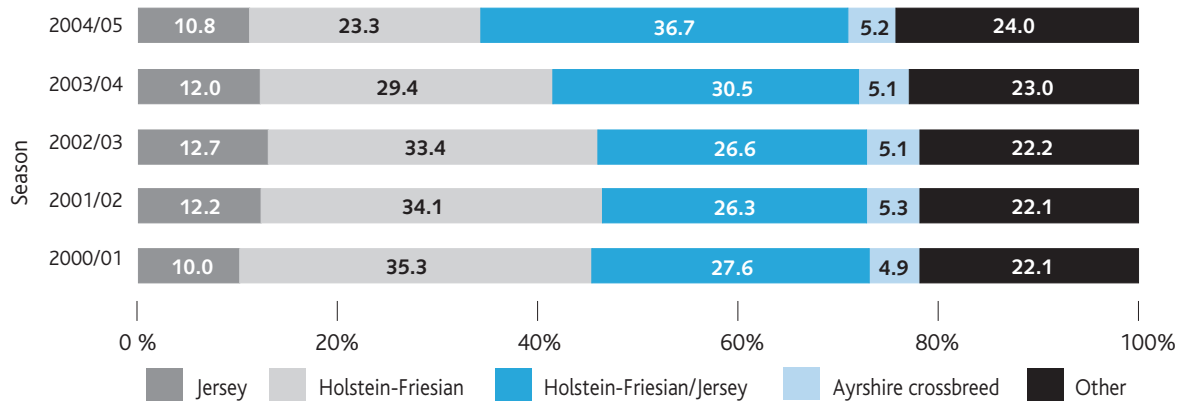
Herd improvement – Artificial breeding statistics

The use of Ayrshire, Holstein-Friesian, and Jersey semen over different cow breeds for the past five seasons is shown in the graphs below. Ayrshire semen use over Ayrshire cows is 28.1% (Graph 4.6). Crossbreed semen is used increasingly over Friesian/Jersey crosses followed by Friesian cows (Graph 4.7). The trend in the use of Jersey semen over Friesians is decreasing, but increasing over Friesian/Jersey crosses (Graph 4.8). The percentage of Holstein-Friesian semen over Holstein-Friesian cows continues to decrease, and has been increasing over Friesian/Jersey crosses (Graph 4.9).

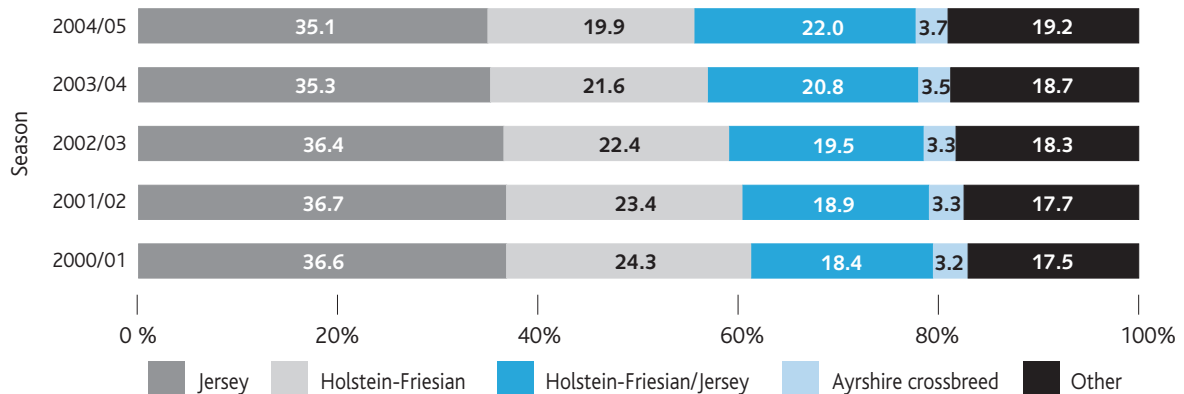
Graph 4.6 *Ayrshire semen usage (%) over cow breed for the last five seasons*



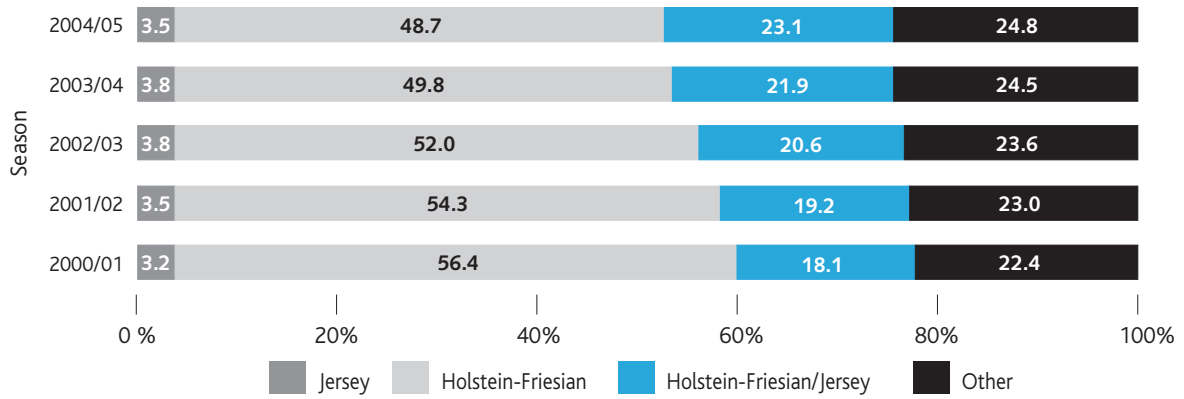
Graph 4.7 *Crossbreed semen usage (%) over cow breed for the last five seasons*



Graph 4.8 *Jersey semen usage (%) over cow breed for the last five seasons*

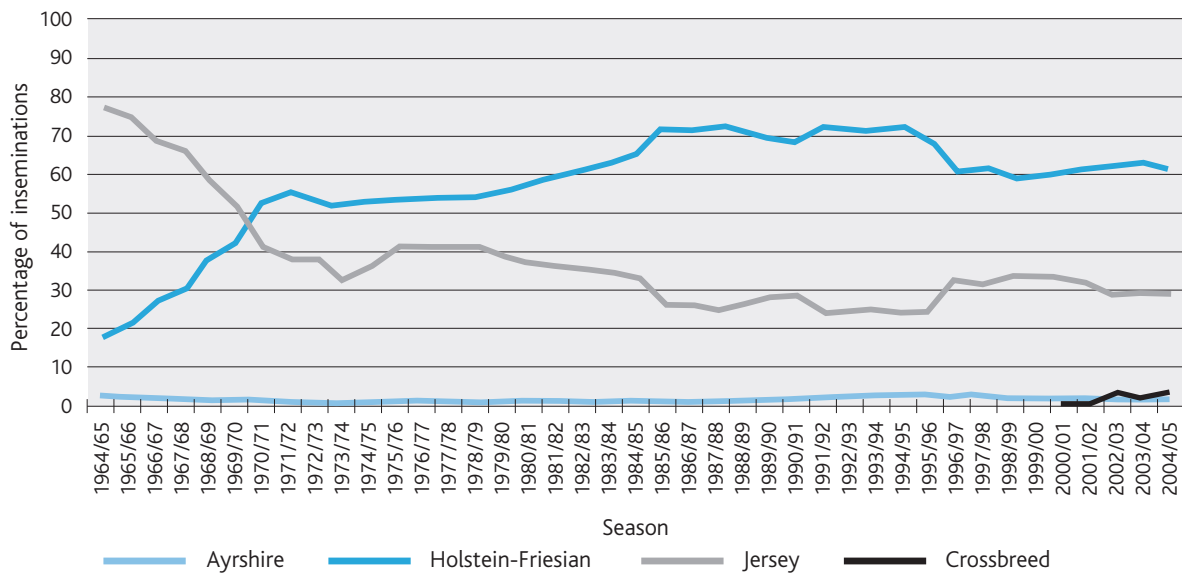


Graph 4.9 *Holstein-Friesian semen usage (%) over cow breed for the last five seasons*



The percentage of inseminations for each major breed (Holstein-Friesian, Jersey and Ayrshire) as recorded on the Livestock Improvement Database is shown in Graph 4.10. The percentage of inseminations for the three breeds is similar to that of the previous season. The percentage of inseminations for Crossbred (shown for the last four seasons) increased from 2.3% in 2003/04 to 4.0% for the 2004/05 season.

Graph 4.10 *Trend in the percentage of inseminations of each major breed for the last 40 seasons*



D. Animal Evaluation

The genetic merit of New Zealand dairy cows and sires is estimated using statistical methods which allow simultaneous evaluation of cows and sires of all breeds, using all recorded relationships. The structure of the national herd reveals large numbers of crossbred cows, and large numbers of herds with mixed breeds. For this reason the national evaluation system is designed to compare animals irrespective of breed, both nationally and within herd, to assist farmers to select the most profitable animals for the future.

animal
evaluation



There are two types of evaluation calculated for New Zealand dairy animals:

- Trait evaluations** are estimates of an animal's genetic merit (*Breeding Values*), lifetime productive ability (*Production Values*) and current season productive ability (*Lactation Values*) for individual traits, including milkfat, protein, volume, liveweight, somatic cell, fertility and residual survival.
- Economic evaluations** combine an animal's individual trait evaluations to estimate its comparative ability to convert feed into profit, through breeding replacements (*Breeding Worth*), lifetime production (*Production Worth*) and current season production (*Lactation Worth*).

For each economic index, Economic Values are calculated for the relevant traits. For Breeding Worth, the Economic Values represent the net income per unit of feed from breeding replacements with a one unit genetic improvement in the trait. For Production Worth, the Economic Values represent the net income per unit of feed from milking cows with a one unit improved productive ability in the trait. In each case the base unit of feed is 4.5 tonnes of dry matter in average quality pasture.

The profit-related traits are combined into a single economic index. For example:

$$\begin{aligned}
 \text{Breeding Worth} &= \text{Milkfat BV} && \times && \$\text{EV (Milkfat)} && + \\
 &\text{Protein BV} && \times && \$\text{EV (Protein)} && + \\
 &\text{Milk BV} && \times && \$\text{EV (Milk)} && + \\
 &\text{Liveweight BV} && \times && \$\text{EV (Liveweight)} && + \\
 &\text{Somatic Cell BV} && \times && \$\text{EV (Somatic cell)} && + \\
 &\text{Fertility BV} && \times && \$\text{EV (Fertility)} && + \\
 &\text{Residual Survival BV} && \times && \$\text{EV (Residual Survival)} &&
 \end{aligned}$$

where : BV = Breeding Value for each trait

\$EV = economic value for each trait for breeding replacements

Animal Evaluation ranks animals in terms of their expected profit per unit of feed eaten. Breeding Worth (BW) and Production Worth (PW) are based on future price predictions for milk components, while Lactation Worth (LW) is based on predicted end of season prices. The economic values for 2005 are presented below (Table 4.9). The economic values are reviewed annually and therefore may change from year to year.

Table 4.9 Economic values used from 19 February 2005

	Milkfat (\$/kg)	Protein (\$/kg)	Milk (\$/kg)	Liveweight (\$/kg)	Somatic Cell (\$/score)	Fertility (%/%)	Residual Survival (\$/day)
Breeding Worth	0.840	6.041	-0.069	-0.822	-21.456	1.509	0.028
Production Worth	1.008	5.438	-0.064	-0.801	–	–	–
Lactation Worth	1.330	6.334	-0.072	-0.977	–	–	–

The information for all Animal Evaluation statistics was sourced from cows and sires recorded on the Livestock Improvement National Database as at 14 May 2005.



Herd improvement – Animal evaluation

Table 4.10 shows the Breeding Values (BV) and BW by breed, of all bulls born in 2000 first proven in the 2004/05 season with a BW Reliability of 75% or greater. Reliability of BW is reported on a scale from 0% to 99%. 0% is the case where there are no performance records for any related animal used in the bull's evaluation. 99% is the case where the bull has a very large number of performance-recorded daughters.

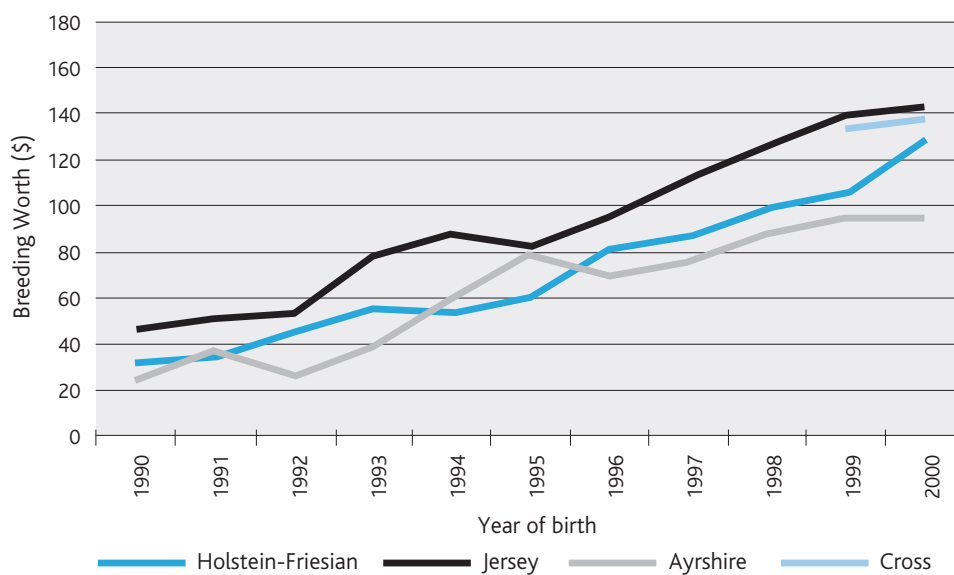
Table 4.10 **Average Breeding Values and Breeding Worth of 2000 born bulls (reliability of 75% or greater)**

Breed	Milkfat BV	Protein BV	Milk Volume BV	Liveweight BV	Somatic Cell BV	Fertility BV	Residual Survival BV	BW	Number of Bulls
Ayrshire	21.6	22.0	579.3	18.6	-0.2	-2.8	52	94.4	12
Holstein Friesian	37.2	41.4	1212.7	76.2	0.3	-1.8	38	128.0	190
Jersey	30.7	16.6	155.1	-31.9	0.2	1.7	123	142.5	118
Holstein Friesian/Jersey Cross	32.8	28.0	605.8	19.9	0.2	0.2	118	137.7	63

(Evaluation Date: 14 May 2005)

The genetic trend of proven dairy bulls is shown in Graph 4.11. Bulls born in 2000 are first proven in the 2004/05 season.

Graph 4.11 **Genetic trend of proven dairy bulls by year of birth (reliability of 75% or greater)**



(Evaluation date: 14 May 2005)

Young bulls are initially selected for use in Artificial Breeding based on the genetic merit of their sire and dam. These young sires are then progeny tested to estimate their Breeding Worth more accurately via the performance of their daughters. Each year some progeny tested bulls are returned to service for use as proven sires.

Table 4.11 shows the number of sires, by birth year and breed, for which the reliability of the BW was at least 75%. The information in this table is updated every year for all age groups to include older bulls that have now been proven in New Zealand.

Table 4.11 **Number of sires by birth year and breed (reliability of BW 75% or greater, includes overseas bulls)**

Year of Birth	Number of Sires	Holstein-Friesian	Jersey	Holstein-Friesian Jersey Cross	Ayrshire	Other Breeds
1990	371	223	108	0	29	11
1991	415	265	104	0	32	14
1992	418	260	119	1	29	10
1993	403	239	121	0	35	8
1994	435	261	132	2	38	4
1995	464	281	135	0	39	9
1996	405	227	142	1	32	4
1997	401	248	124	3	24	5
1998	396	229	139	6	25	3
1999	347	196	124	22	24	3
2000	322	190	118	63	12	2

(Evaluation date: 14 May 2005)



Herd improvement – Animal evaluation

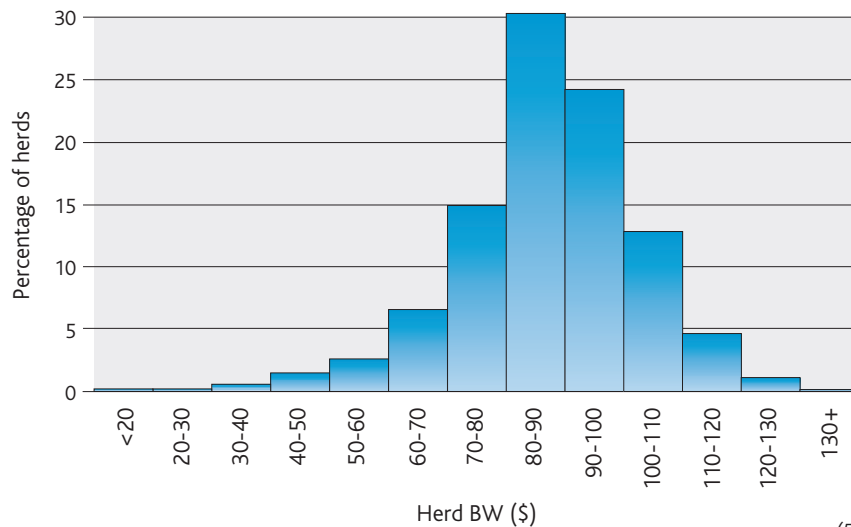
The Breeding Worth for **herds** presented below (Table 4.12 and Graph 4.12) is based on cows of the users of the Livestock Improvement herd testing service, in herds with at least 80 cows, and signed up for herd testing in the 2004/05 season. Table 4.12 shows that 50% of these herds had a BW of 89 or above and 25% of these herds had a BW of 98 or above.

Table 4.12 *Herd Breeding Worth in 2004/05*

	Median	Top 5%	Top 10%	Top 25%	Bottom 25%	Bottom 10%	Bottom 5%
Herd BW	89	> 112	> 107	> 98	< 79	< 68	< 60

(Evaluation date: 14 May 2005)

Graph 4.12 *Distribution of Herd Breeding Worth in 2004/05*



(Evaluation date: 14 May 2005)

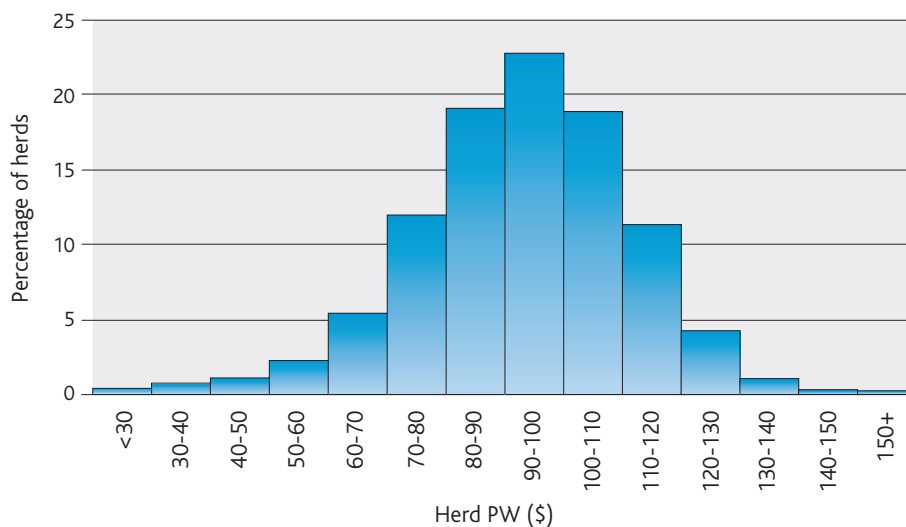
The Production Worth (PW) for **herds** presented below (Table 4.13 and Graph 4.13) is based on cows of the users of the Livestock Improvement herd testing service, in herds with at least 80 cows, and signed up for herd testing in the 2004/05 season. Table 4.13 shows that 50% of these herds had a PW of 95 or above and 25% of these herds had a PW of 106 or above.

Table 4.13 *Herd Production Worth in 2004/05*

	Median	Top 5%	Top 10%	Top 25%	Bottom 25%	Bottom 10%	Bottom 5%
Herd PW	95	> 122	> 116	> 106	< 82	< 71	< 62

(Evaluation date: 14 May 2005)

Graph 4.13 *Distribution of Herd Production Worth in 2004/05*



(Evaluation date: 14 May 2005)



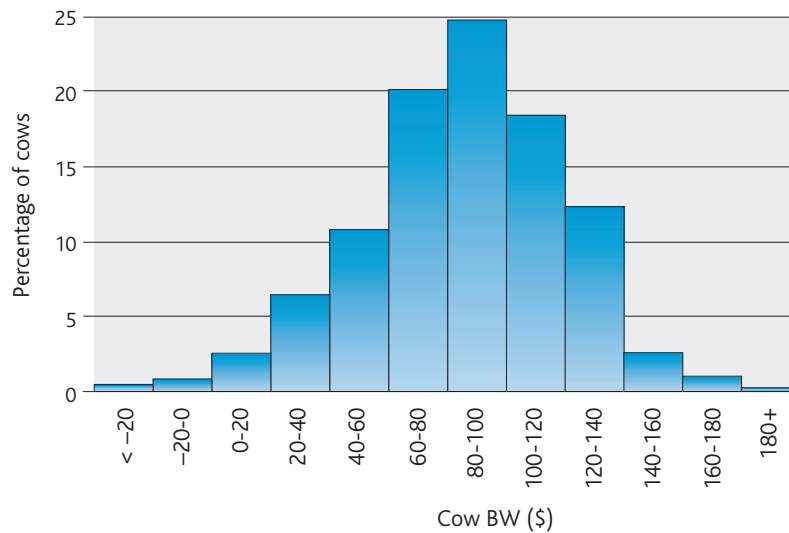
The Breeding Worth (BW) for **cows** presented below (Table 4.14 and Graph 4.14) is based on all cows of the users of the Livestock Improvement herd testing service, in herds with at least 80 cows, and signed up for herd testing in the 2004/05 season. Table 4.14 shows that 50% of these cows had a BW of 90 or above and that 25% of these cows had a BW of 112 or above.

Table 4.14 **Cow Breeding Worth in 2004/05**

	Median	Top 5%	Top 10%	Top 25%	Bottom 25%	Bottom 10%	Bottom 5%
Cow BW	90	> 142	> 131	> 112	< 66	< 42	< 27

(Evaluation date: 14 May 2005)

Graph 4.14 **Distribution of Cow Breeding Worth in 2004/05**



(Evaluation date: 14 May 2005)

30

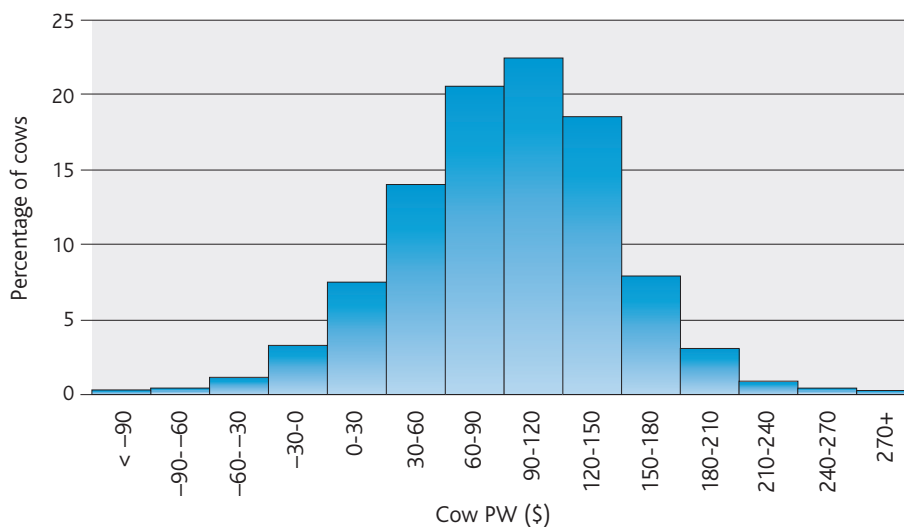
The Production Worth (PW) for **cows** presented below (Table 4.15 and Graph 4.15) is based on cows of the users of the Livestock Improvement herd testing service, in herds with at least 80 cows, and signed up for herd testing for the 2004/05 season. Table 4.15 shows that 50% of these cows had a PW of 95 or above and that 25% of these cows had a PW of 129 or above.

Table 4.15 **Cow Production Worth in 2004/05**

	Median	Top 5%	Top 10%	Top 25%	Bottom 25%	Bottom 10%	Bottom 5%
Cow PW	95	> 179	> 159	> 129	< 59	< 25	< 4

(Evaluation date: 14 May 2005)

Graph 4.15 **Distribution of Cow Production Worth in 2004/05**

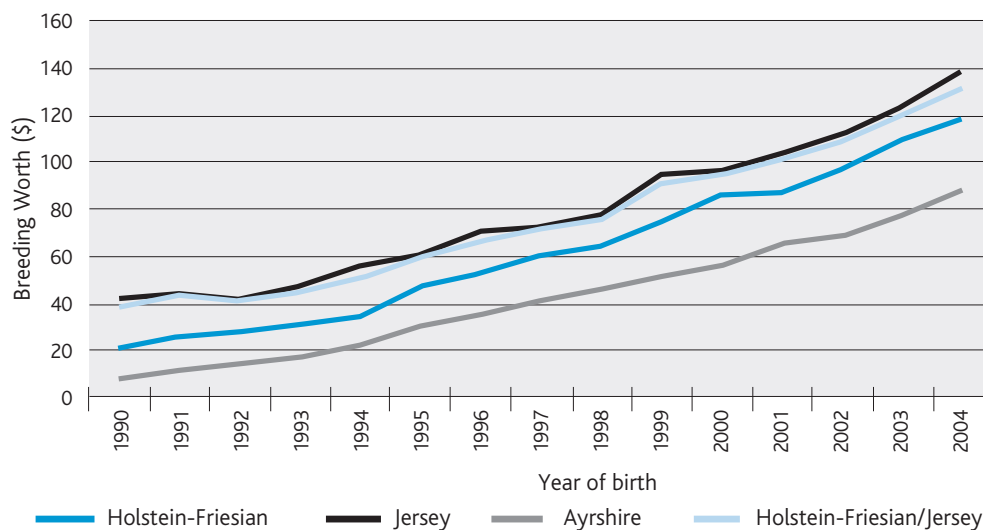


(Evaluation date: 14 May 2005)



The genetic trend for cows is based on all cows (alive or dead) recorded on the Livestock Improvement National Database in the 2004/05 season. Also included are the estimated BW and PW for replacement stock (2003 and 2004 born animals). All evaluations can be compared across breeds. The genetic trend for BW by breed is presented in Graph 4.16. The Breeding Worth for all breeds has increased over time.

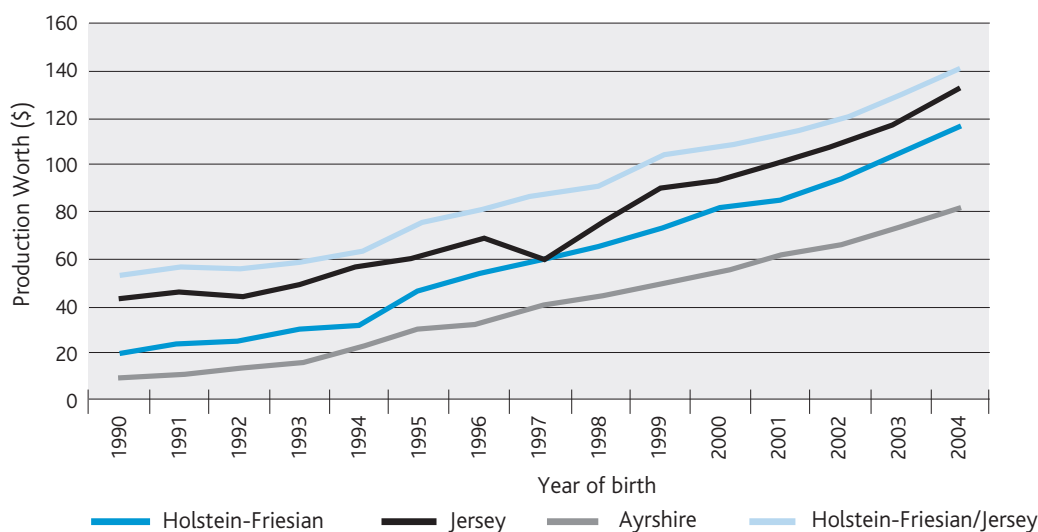
Graph 4.16 *Trend in Breeding Worth for all cows in 2004/05*



(Evaluation date: 14 May 2005)

The trend for PW by breed is presented in Graph 4.17. Holstein-Friesian/Jersey crossbreeds have maintained a higher PW over other breeds, caused by the effects of heterosis (hybrid vigour) in the crossbreeds.

Graph 4.17 *Trend in Production Worth for all cows in 2004/05*



(Evaluation date: 14 May 2005)



Table 4.16 shows the average BVs and BW by breed, of all 2002 born cows. The Jersey cows had the highest average BW at 111.9. The Holstein-Friesian cows had the highest milkfat, protein, and milk volume BVs. All evaluations are comparable across breeds.

Table 4.16 Average Breeding Worth and Breeding Value of all cows by breed born in 2002

Breed	BW \$	Milkfat BV (kg)	Protein BV (kg)	Milk Volume BV (l)	Liveweight BV (kg)	Somatic Cell BV (score)	Fertility BV (%)	Residual Survival BV (days)	Cow Numbers
Holstein-Friesian	96.3	30.9	31.2	925	60.2	0.27	-0.5	72	425,503
Jersey	111.9	22.1	10.3	11	-38.7	0.22	1.3	110	130,280
Ayrshire	69.3	12.8	17.4	517	12.3	-0.02	-3.1	119	9,443
Holstein-Friesian /Jersey	108.3	27.9	21.9	507	13.7	0.22	0.5	103	295,395
Guernsey	-27.2	-1.5	3.4	110	25.8	0.43	0.2	-321	143
Milking Shorthorn	5.4	-1.9	7.6	219	22.8	0.15	-1.3	6	837
Brown Swiss	-8.3	-0.3	11.2	312	50.1	0.02	-5.8	-128	114
Other	81.8	20.2	18.7	525	19.4	-0.18	-0.9	62	30,224
Weighted Average	101.7	28.0	24.4	634	28.4	0.23	0.1	88	891,939

(Evaluation date: 14 May 2005)

Survivability is measured by the percentage of cows that have a lactation recorded for consecutive years. The 2004/05 season 2-3 years figure is the percentage of cows that were milking as two-year-olds in the 2003/04 season and are now milking as three-year-olds in the 2004/05 season. Table 4.17 shows that for the 2004/05 season the highest percentage of survival is in animals ageing from 3-4 years (87.3%), followed by animals ageing from 4-5 years (86.7%).

Table 4.17 Survivability percentages since 1996/97

Season	Percentage (%) of age group surviving to next lactation						
	2-3 years	3-4 years	4-5 years	5-6 years	6-7 years	7-8 years	8-9 years
1996/97	84.9	85.1	84.8	81.6	78.2	74.2	69.0
1997/98	85.9	86.7	85.6	81.9	77.7	73.9	68.3
1998/99	84.5	86.1	85.8	83.0	80.0	75.5	70.5
1999/00	84.1	86.2	85.8	82.8	80.7	76.3	70.8
2000/01	85.3	86.7	86.5	83.2	80.1	76.5	71.7
2001/02	85.6	88.4	86.8	84.3	80.8	77.1	73.5
2002/03	85.7	85.9	86.6	83.8	80.8	76.0	71.2
2003/04	85.2	86.9	86.0	83.0	78.7	74.8	69.4
2004/05	85.7	87.3	86.7	82.7	79.7	74.6	69.6

