

4. Herd improvement

A. Use of herd testing

Farmers had the choice of two herd testing service providers in 2002/03. Users of the Livestock Improvement service were able to choose between Self Sample Service (where the farmer does the sampling using equipment supplied by Livestock Improvement), and Self Sample Assist (where the farmer does the sampling using equipment supplied by Livestock Improvement and Livestock Improvement provides an assist officer).

All herd test systems are based on measured yields obtained over a 24-hour period, with samples collected from consecutive evening and morning milkings.

Farmers were able to choose the frequency of testing. If farmers tested four or more times a season, they received information on individual cows' milk, milkfat and protein yields, milkfat and protein percentages, and somatic cell count information. Also included was the Production Worth, which takes account of each lactation of the cow as well as the date of calving, age, stage of lactation and Breeding Worth.

Farmers who opted for two or three tests during the season received Production Worth for individual cows but did not receive estimated lactation yields for milk, milkfat, or protein. Production Worth information is sufficient for farmers to cull for low production.

- **77% of herds undertake herd testing in 2002/03**

The regional uptake of herd testing services in 2002/03 is shown in Table 4.1, where the number of cows tested refers to all cows tested at least once in the season. Taranaki and Bay of Plenty/East Coast regions had the highest percentage of herds using herd testing with 82.6% and 80.8% respectively. Taranaki at 84.1% reported the highest percentage of cows herd tested.

Table 4.1 Use of herd testing by region in 2002/03

Livestock Improvement Region	Herds tested	Total herds	% of total herds	Cows tested	Total cows	% of total cows
Northland	1,088	1,529	71.2	259,016	345,306	75.0
Auckland	3,915	5,172	75.7	1,035,578	1,380,627	75.0
Bay of Plenty/East Coast	578	715	80.8	153,260	188,831	81.2
Taranaki	1,778	2,152	82.6	407,455	484,324	84.1
Wellington/Hawkes Bay	991	1,297	76.4	293,309	382,389	76.7
South Island	1,763	2,275	77.5	705,961	959,160	73.6
New Zealand	10,113	13,140	77.0	2,854,579	3,740,637	76.3



Herd improvement – Use of herd testing

The percentage of total herds using herd testing decreased to 77.0% in 2002/03 (Table 4.2). This figure is down 10.2% from the highest percentage of herd testing set in 1996/97. Although there are a record number of cows (3.74 million), fewer were tested (2.86 million) compared with last season (2.97 million). The percentage of total cows tested (76.3%) was the lowest in ten years.

Table 4.2 **Trend in the use of herd testing services since 1955/56**

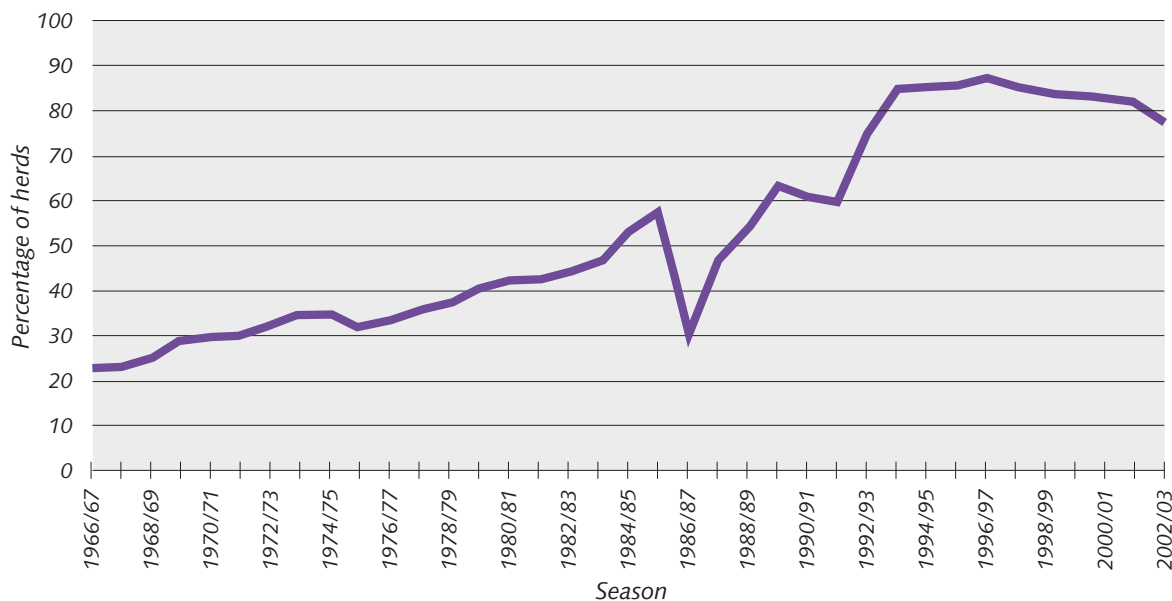
Season	Number of herds	% of total herds	Number of cows (000)	% of total cows
1955/56	7,469	21.0	476	23.8
1960/61	7,006	22.5	494	25.6
1965/66	6,206	23.5	521	25.0
1966/67	5,730	22.7	501	23.5
1967/68	5,724	23.1	538	24.1
1968/69	6,089	24.7	601	26.1
1969/70	6,768	28.4	700	30.2
1970/71	6,574	29.3	716	32.0
1971/72	6,274	29.6	690	31.4
1972/73	6,771	32.6	772	35.3
1973/74	6,640	34.7	780	36.4
1974/75	6,436	34.7	779	37.5
1975/76	5,858	31.8	706	33.7
1976/77	5,945	33.2	725	34.9
1977/78	6,159	35.5	771	37.6
1978/79	6,250	37.0	801	39.3
1979/80	6,662	40.4	871	42.6
1980/81	6,789	42.2	909	44.8
1981/82	6,702	42.4	922	44.7
1982/83	7,018	44.4	995	46.8
1983/84	7,430	46.6	1,092	49.4
1984/85	8,445	53.2	1,294	56.7
1985/86	9,026	57.3	1,484	63.9
1986/87	4,555	29.7	753	33.0
1987/88	6,930	46.8	1,175	52.5
1988/89	7,932	53.8	1,341	59.1
1989/90	9,213	63.1	1,604	69.3
1990/91	8,918	60.7	1,566	65.2
1991/92	8,661	59.9	1,611	66.1
1992/93	10,843	75.0	2,039	78.3
1993/94	12,372	84.8	2,377	86.9
1994/95	12,446	85.0	2,474	87.4
1995/96	12,620	85.6	2,592	88.3
1996/97	12,851	87.2	2,746	89.6
1997/98	12,510	85.3	2,826	87.7
1998/99	12,059	84.0	2,819	85.7
1999/00	11,521	83.1	2,806	85.8
2000/01	11,472	82.6	2,942	84.4
2001/02	11,113	81.4	2,974	80.5
2002/03	10,113	77.0	2,855	76.3



Herd improvement – Herd test averages

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 since 1966/67



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

Average per cow statistics for each Livestock Improvement region is summarised in Table 4.3. The additional information for the days in milk (production) more accurately reflects the lactation length by using milk supply information from seasonal suppliers compared with days in milk (herd testing). Days in milk (production) figures were unavailable for the 2002/03 season. The South Island recorded the highest per cow per day milk volume (4,289 litres), milkfat (197 kg) and protein (159 kg) of cows herd tested. Taranaki recorded the highest percentages for milkfat (4.98%), protein (3.80%) and milksolids (8.91%).

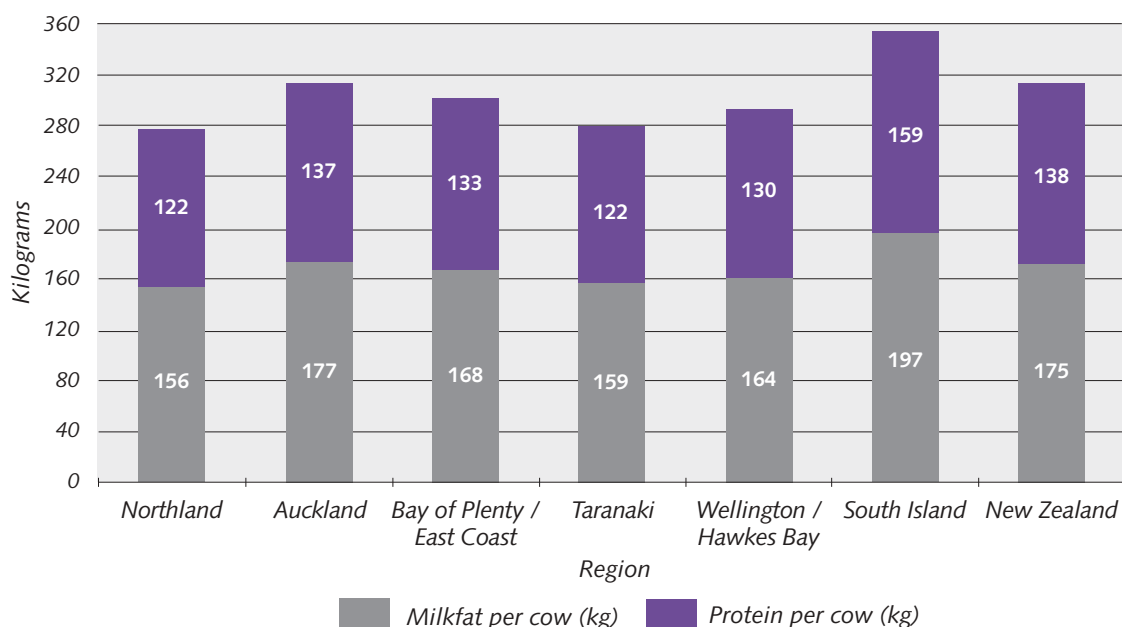
Table 4.3 Season herd test averages per cow by region in 2002/03

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	3,391	156	4.61	122	3.59	278	8.20	222	–	216
Auckland	3,740	177	4.72	137	3.65	314	8.40	225	–	201
Bay of Plenty / East Coast	3,716	168	4.45	133	3.49	301	8.10	212	–	222
Taranaki	3,154	159	4.98	122	3.80	281	8.91	205	–	225
Wellington / Hawkes Bay	3,568	164	4.55	130	3.57	294	8.24	208	–	243
South Island	4,289	197	4.58	159	3.67	356	8.30	225	–	227
New Zealand	3,736	175	4.68	138	3.66	313	8.38	219	–	213

– Not available

The 2002/03 milkfat and protein lactation regional averages of herd tested cows (Graph 4.2) shows some variability in values between all regions, with milkfat production ranging from 156 (Northland) to 197 kg per cow (South Island) and protein production from 122 (Northland and Taranaki) to 159 kg per cow (South Island).

Graph 4.2 Average milkfat and protein production per cow in 2002/03



Herd improvement – Herd test averages – Season averages

- Increase in production per cow percentages for 2002/03

The last twenty years has seen a general trend of increasing production in both milk volume and milkfat. However, in individual years this trend can be masked by other factors, in particular, weather conditions. The 1998/99 season shows a decrease in production per cow, the lowest in more than 10 years (Table 4.4).

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, farm management practice, and climatic conditions.

Table 4.4 Trend in the national herd test averages since 1970/71

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)
1970/71	2,809	134	4.77	–	–	–	–	–	–	–
1971/72	3,089	146	4.73	–	–	–	–	–	–	–
1972/73	2,941	139	4.73	–	–	–	–	–	–	–
1973/74	2,797	135	4.83	–	–	–	–	–	–	–
1974/75	2,913	138	4.74	–	–	–	–	–	–	–
1975/76	3,112	149	4.79	–	–	–	–	–	–	–
1976/77	3,240	154	4.75	–	–	–	–	–	–	–
1977/78	3,027	142	4.69	–	–	–	–	–	–	–
1978/79	3,266	155	4.75	–	–	–	–	–	–	–
1979/80	3,380	162	4.79	–	–	–	–	–	–	–
1980/81	3,331	160	4.80	–	–	–	–	–	–	–
1981/82	3,326	159	4.78	–	–	–	–	–	–	–
1982/83	3,377	160	4.74	–	–	–	–	–	–	–
1983/84	3,451	165	4.78	–	–	–	–	–	–	–
1984/85	3,416	162	4.74	–	–	–	–	–	–	–
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

- Not available

^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 milk volume. 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 region in 2002/03

Average litres of milk per cow per day

Livestock Improvement Region	2002							2003					Season average
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	
Northland	14.74	13.16	16.27	18.33	17.86	17.09	14.59	13.33	12.12	10.45	10.24	12.39	14.62
Auckland	16.37	15.77	18.24	20.22	20.26	18.60	17.39	15.44	13.24	11.06	10.65	11.91	16.02
BOP / East Coast	16.25	14.27	20.98	21.95	21.70	19.91	17.84	14.94	13.00	11.59	11.23	12.24	16.91
Taranaki	19.92	15.93	17.84	18.80	18.54	17.58	16.35	14.23	11.81	8.79	8.58	10.61	14.81
Wgtn / Hawkes Bay	14.02	15.91	17.99	20.28	20.56	19.76	18.25	15.49	13.39	10.73	10.81	12.86	16.43
South Island	17.26	16.91	18.33	23.34	23.37	21.88	20.38	17.95	16.85	14.99	12.07	11.84	18.23
New Zealand	15.70	15.47	17.96	20.28	20.85	19.05	18.17	15.34	14.06	11.38	11.02	11.94	16.36

Average kg of milkfat per cow per day

Livestock Improvement Region	2002							2003					Season average
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	
Northland	0.64	0.60	0.71	0.79	0.79	0.78	0.66	0.65	0.59	0.55	0.54	0.61	0.68
Auckland	0.70	0.68	0.83	0.90	0.91	0.87	0.80	0.75	0.66	0.59	0.57	0.62	0.76
BOP / East Coast	0.69	0.63	0.89	0.94	0.94	0.89	0.79	0.69	0.63	0.59	0.58	0.58	0.77
Taranaki	0.90	0.76	0.84	0.88	0.88	0.88	0.81	0.74	0.64	0.51	0.52	0.60	0.75
Wgtn / Hawkes Bay	0.62	0.72	0.79	0.89	0.91	0.90	0.82	0.73	0.66	0.56	0.57	0.64	0.76
South Island	0.76	0.74	0.78	1.01	1.01	0.98	0.92	0.83	0.81	0.74	0.64	0.63	0.85
New Zealand	0.68	0.68	0.80	0.90	0.93	0.89	0.83	0.74	0.70	0.60	0.59	0.62	0.77

Average kg of protein per cow per day

Livestock Improvement Region	2002							2003					Season average
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	
Northland	0.51	0.46	0.57	0.65	0.65	0.62	0.52	0.48	0.44	0.40	0.41	0.47	0.53
Auckland	0.55	0.54	0.66	0.72	0.74	0.69	0.63	0.57	0.48	0.43	0.43	0.48	0.59
BOP / East Coast	0.55	0.50	0.75	0.77	0.77	0.72	0.63	0.52	0.46	0.44	0.44	0.46	0.61
Taranaki	0.66	0.57	0.66	0.69	0.70	0.69	0.63	0.55	0.46	0.36	0.37	0.45	0.57
Wgtn / Hawkes Bay	0.49	0.55	0.64	0.72	0.74	0.73	0.66	0.56	0.49	0.42	0.43	0.50	0.60
South Island	0.60	0.56	0.61	0.83	0.85	0.80	0.74	0.65	0.64	0.58	0.50	0.48	0.68
New Zealand	0.54	0.53	0.64	0.73	0.76	0.71	0.66	0.56	0.52	0.45	0.45	0.48	0.61

Average somatic cell count (000 cells per millilitre)

Livestock Improvement Region	2002							2003					Season average
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	
Northland	224	221	193	191	184	183	201	222	229	257	269	283	216
Auckland	232	228	173	174	166	164	173	193	209	243	260	284	201
BOP / East Coast	229	261	226	189	200	181	191	210	238	258	259	297	222
Taranaki	330	262	209	180	190	172	182	189	213	266	276	282	225
Wgtn / Hawkes Bay	265	239	247	228	223	220	224	228	247	286	303	267	243
South Island	222	247	253	212	212	208	212	227	214	243	248	263	227
New Zealand	235	236	198	187	189	180	192	204	218	254	263	274	213



iii) Breed averages

• Holstein-Friesian/Jersey Crossbred cows show higher milkfat production

Holstein-Friesian, Jersey, Ayrshire and Holstein-Friesian/Jersey Crossbred herd test statistics were analysed for the 2002/03 season. The breed averages listed in Table 4.6 are for cows herd tested four or more times during the season.

On average, Holstein-Friesian/Jersey Crossbred 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, milkfat and protein than any other age group. Six-year-olds dominated production for Jerseys and Holstein-Friesian/Jersey Crossbreds, while seven-year-olds had the highest production for Ayrshires.

A crossbred is defined as having at most 13/16 of any one breed. For example, a Holstein-Friesian/Jersey Crossbred 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 2002/03

Holstein-Friesian

Age	Number	Days in milk	Milk (litres)	Milkfat (kg)	Protein (kg)	Milkfat (%)	Protein (%)
2	205,334	220	3,381	147.0	119.0	4.38	3.53
3	165,631	216	3,881	166.2	138.0	4.32	3.56
4	152,877	215	4,225	181.3	149.8	4.33	3.56
5	139,296	216	4,348	190.3	155.2	4.41	3.58
6	125,912	216	4,455	193.6	157.1	4.38	3.54
7	107,617	216	4,348	192.4	154.5	4.46	3.56
8	82,576	214	4,228	185.1	148.8	4.41	3.53
9	55,284	210	4,133	178.8	144.4	4.36	3.51
10+	76,351	206	3,805	165.8	133.7	4.39	3.53
Total	1,110,878	216	4,038	175.4	142.9	4.38	3.55

Jersey

Age	Number	Days in milk	Milk (litres)	Milkfat (kg)	Protein (kg)	Milkfat (%)	Protein (%)
2	72,541	222	2,494	140.2	99.3	5.65	3.99
3	60,572	218	2,762	158.4	113.6	5.76	4.12
4	54,895	219	2,904	169.6	121.4	5.87	4.19
5	50,070	219	3,026	175.5	126.5	5.83	4.19
6	39,603	218	3,050	174.5	127.0	5.75	4.18
7	31,590	217	3,026	174.1	125.7	5.78	4.17
8	24,455	214	2,997	169.6	123.4	5.68	4.13
9	17,695	212	2,902	164.5	118.6	5.69	4.10
10+	22,988	207	2,738	154.8	111.6	5.68	4.09
Total	374,409	218	2,839	162.6	116.9	5.75	4.12

Holstein-Friesian/Jersey crossbred (1st-2nd cross)

Age	Number	Days in milk	Milk (litres)	Milkfat (kg)	Protein (kg)	Milkfat (%)	Protein (%)
2	136,716	223	3,110	154.1	116.6	5.00	3.76
3	107,125	219	3,511	174.6	134.5	5.02	3.85
4	91,689	219	3,736	187.8	144.1	5.08	3.88
5	84,618	220	3,875	195.3	150.0	5.08	3.89
6	55,261	218	3,983	196.3	151.3	4.98	3.82
7	43,833	217	3,938	195.1	149.7	5.00	3.82
8	35,677	216	3,863	188.6	145.3	4.92	3.78
9	23,640	213	3,785	182.5	140.8	4.87	3.74
10+	34,309	207	3,507	169.1	130.6	4.86	3.74
Total	612,868	219	3,610	179.1	137.3	5.01	3.82



Herd improvement – Herd test averages – Breed averages

Ayrshire

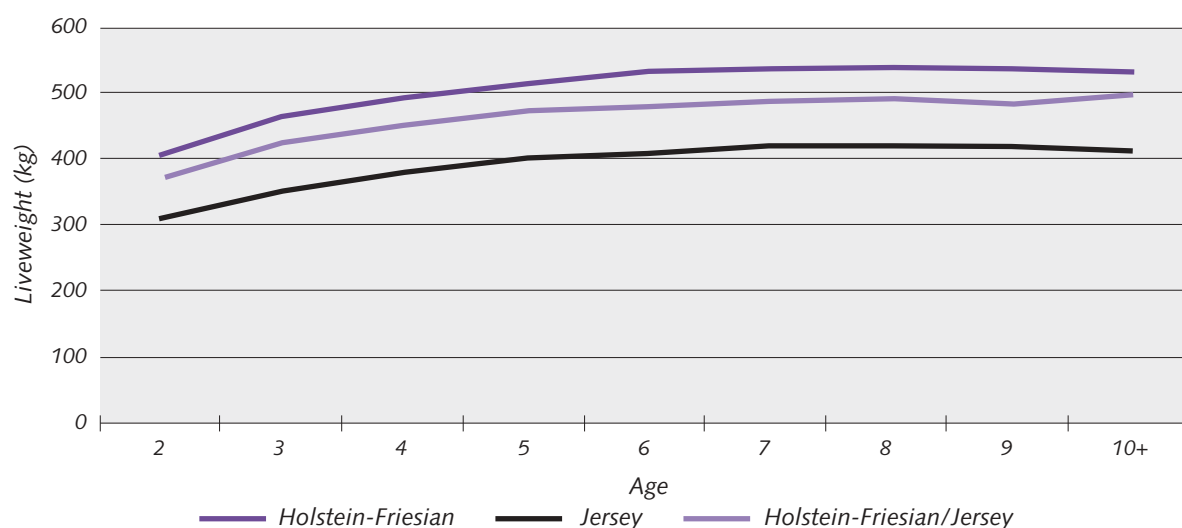
Age	Number	Days in milk	Milk (litres)	Milkfat (kg)	Protein (kg)	Milkfat (%)	Protein (%)
2	4,561	228	2,994	132.7	107.4	4.45	3.59
3	3,953	222	3,370	148.0	122.0	4.41	3.63
4	3,608	220	3,668	159.6	133.1	4.38	3.63
5	3,264	220	3,816	165.9	138.0	4.37	3.62
6	2,860	221	3,900	168.4	140.6	4.34	3.61
7	2,394	220	3,939	169.2	141.5	4.31	3.59
8	1,841	217	3,838	163.0	137.1	4.27	3.58
9	1,393	217	3,704	157.8	131.9	4.28	3.57
10+	2,006	209	3,459	147.4	122.7	4.28	3.55
Total	25,880	220	3,571	154.9	128.5	4.36	3.60

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. Too few liveweights were recorded for Ayrshires to warrant continued inclusion in Table 4.7. Liveweight by age and breed is illustrated in Graph 4.3.

Table 4.7 Liveweight by age and breed of cow in 2002/03

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	406	13,740	310	4,478	371	9,019
3	466	1,361	352	265	428	1,108
4	493	1,013	380	271	452	808
5	515	872	402	203	472	748
6	534	810	409	155	478	508
7	537	617	420	133	485	441
8	539	394	419	107	489	303
9	536	275	419	68	482	215
10+	530	356	412	69	494	227

Graph 4.3 Liveweight by age and breed of cow in 2002/03



C. Artificial Breeding statistics

- 4% decrease in the number of cows to AB for 2002/03

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 first season since 1993/94 where the percentage of cows to AB has dropped below the 80% mark (Graph 4.4). Similarly, the number of yearlings to AB in the 2002/03 season has decreased (Table 4.8).

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

Cows to AB

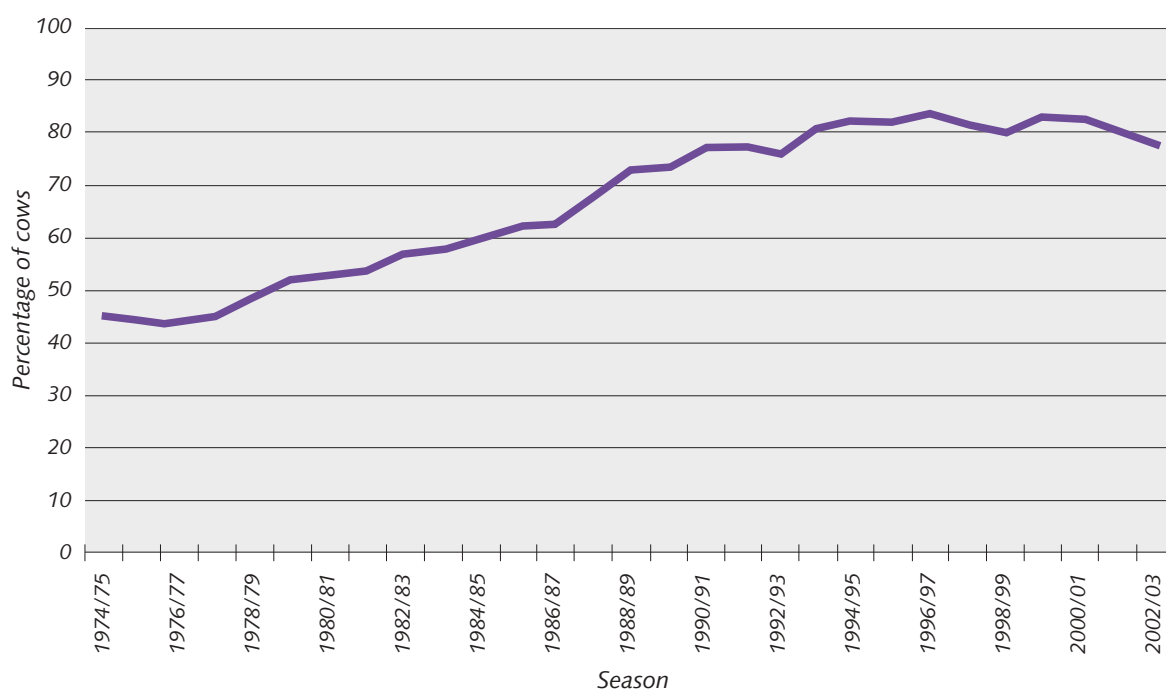
Livestock Improvement Region	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02 ^r	2002/03
Northland	253,662	257,557	262,429	258,057	244,115	246,617	257,752	261,197	228,988
Auckland	992,301	1,007,497	1,065,624	1,069,038	1,066,442	1,057,618	1,096,379	1,089,655	1,030,788
BOP / East Coast	151,469	152,836	155,267	156,602	153,294	152,751	157,162	154,762	147,047
Taranaki	398,201	398,571	399,435	404,930	395,636	405,605	427,683	423,723	400,322
Wgtn / Hawkes Bay	220,471	230,582	254,002	266,514	266,171	276,517	294,387	302,349	291,188
South Island	319,949	371,210	437,078	483,968	510,514	587,957	660,075	756,874	769,954
New Zealand	2,336,053	2,418,253	2,573,835	2,639,109	2,636,172	2,727,065	2,893,438	2,988,560	2,868,287

^r revised

Yearlings to AB

Livestock Improvement Region	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03
Northland	21,159	22,034	20,613	15,966	11,188	9,825	10,437	10,942	7,982
Auckland	54,867	53,038	48,291	31,102	25,968	21,804	24,543	24,988	20,143
BOP / East Coast	16,773	17,501	15,753	10,317	7,854	7,250	8,492	8,929	6,763
Taranaki	19,099	17,864	11,909	8,428	5,748	5,700	7,698	7,528	8,220
Wgtn / Hawkes Bay	13,473	15,321	14,375	9,887	6,223	6,313	7,823	7,517	5,948
South Island	44,715	48,194	54,152	35,159	34,906	41,469	56,743	55,680	47,162
New Zealand	170,086	173,952	165,093	110,859	91,887	92,361	115,736	115,584	96,218

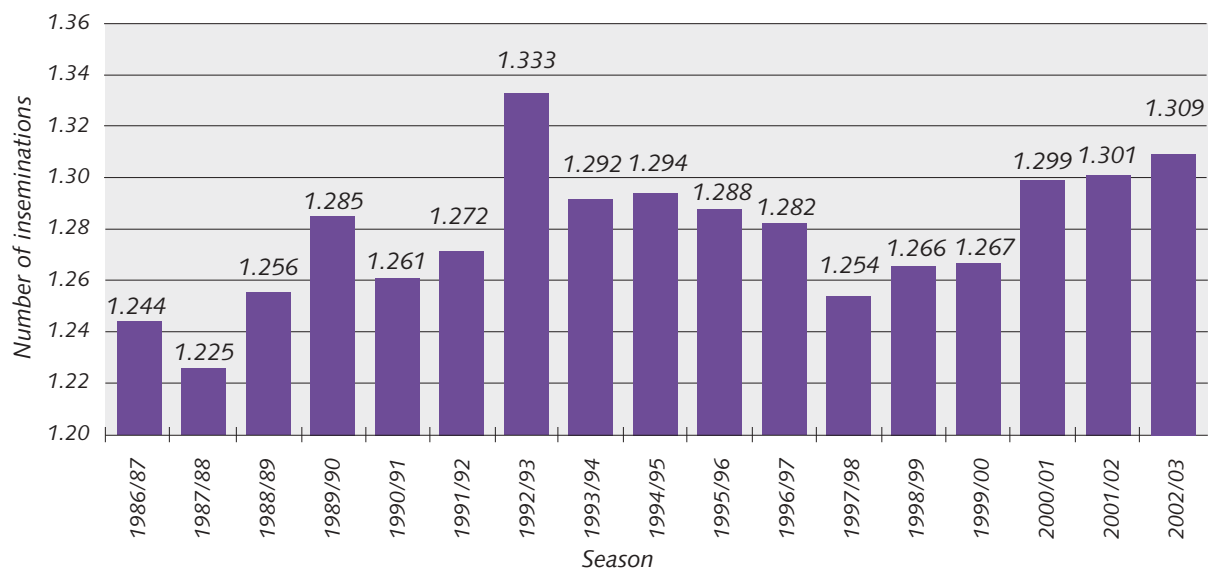
Graph 4.4 Trend in the percentage of cows to Artificial Breeding since 1974/75



Herd improvement – Artificial breeding statistics

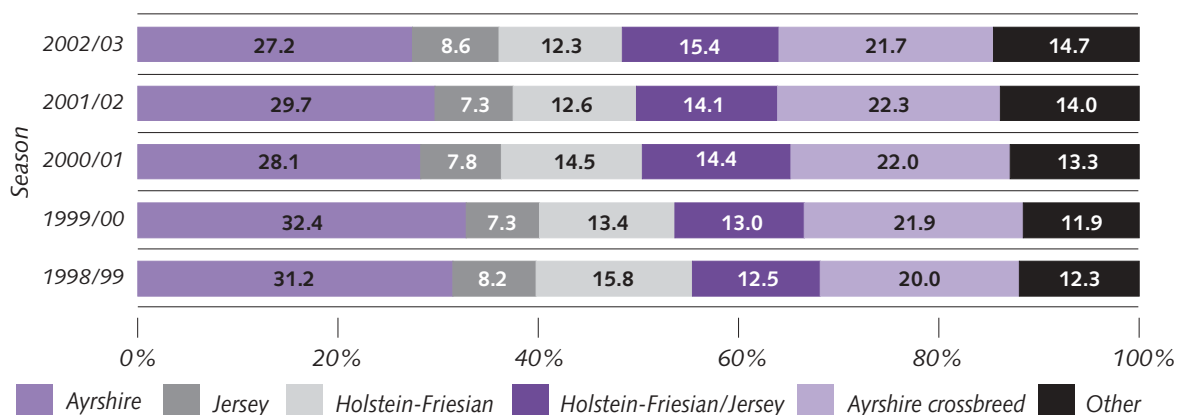
In 2002/03 the average number of inseminations per cow (1.31) as recorded on the Livestock Improvement Database, was similar to previous seasons (Graph 4.5). Figures for 2000/01 and 2001/02 have been revised downwards.

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

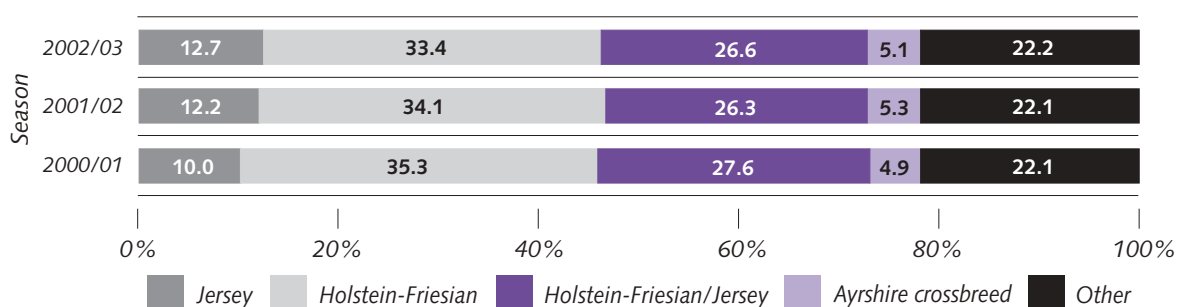


The use of Ayrshire, Holstein-Friesian, Jersey and semen over different cow breeds for the past five seasons is shown in the graphs below. The use of crossbred semen is becoming more prevalent and is now included along with the other breeds (Graph 4.7). Ayrshire semen use over Ayrshire cows is 27.2% (Graph 4.6). Crossbred semen is used predominantly over Friesian cows followed by Friesian/Jersey crosses (Graph 4.7). The use of Jersey semen over other breeds remains similar to previous seasons (Graph 4.8), with slightly more use over Friesian/Jersey cows and less use over Friesians. The percentage of Holstein-Friesian semen over Holstein-Friesian cows continues to decrease (Graph 4.9).

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

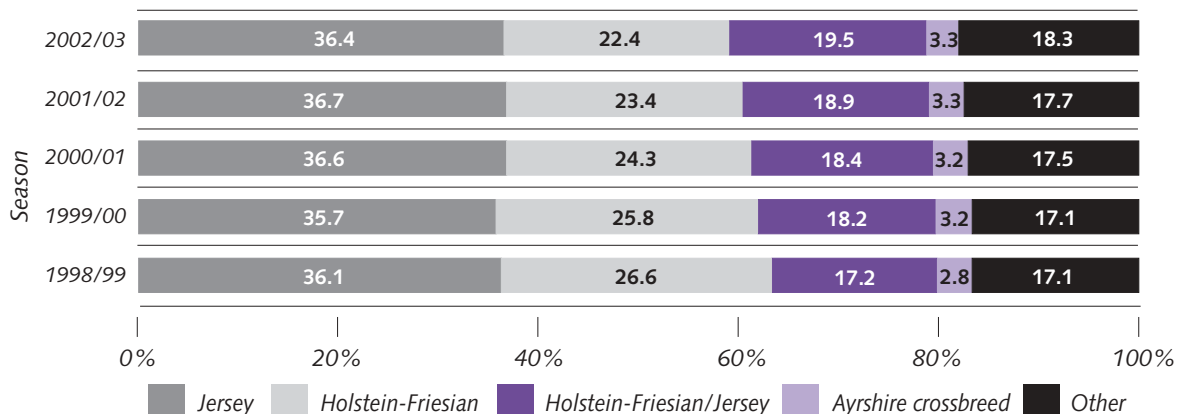


Graph 4.7 Crossbred semen usage (%) by cow breed since 2000/01

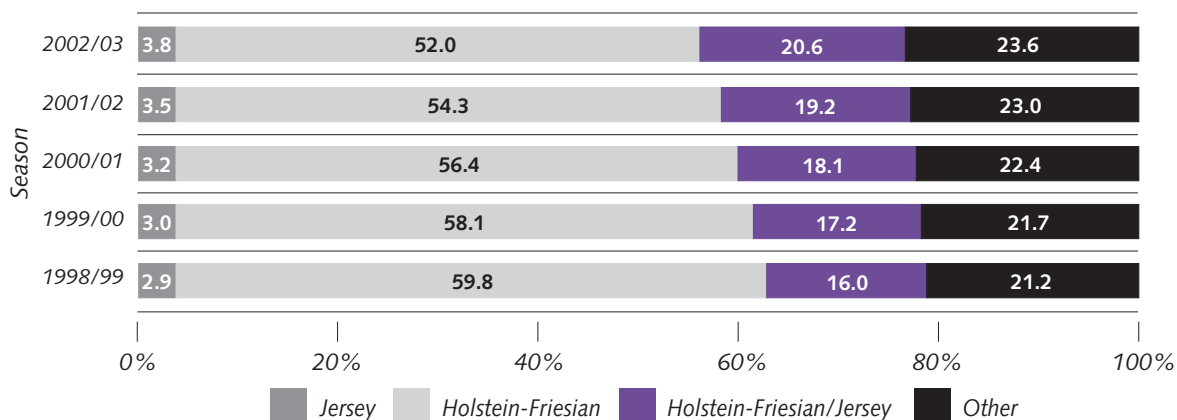


Herd improvement – Artificial breeding statistics

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

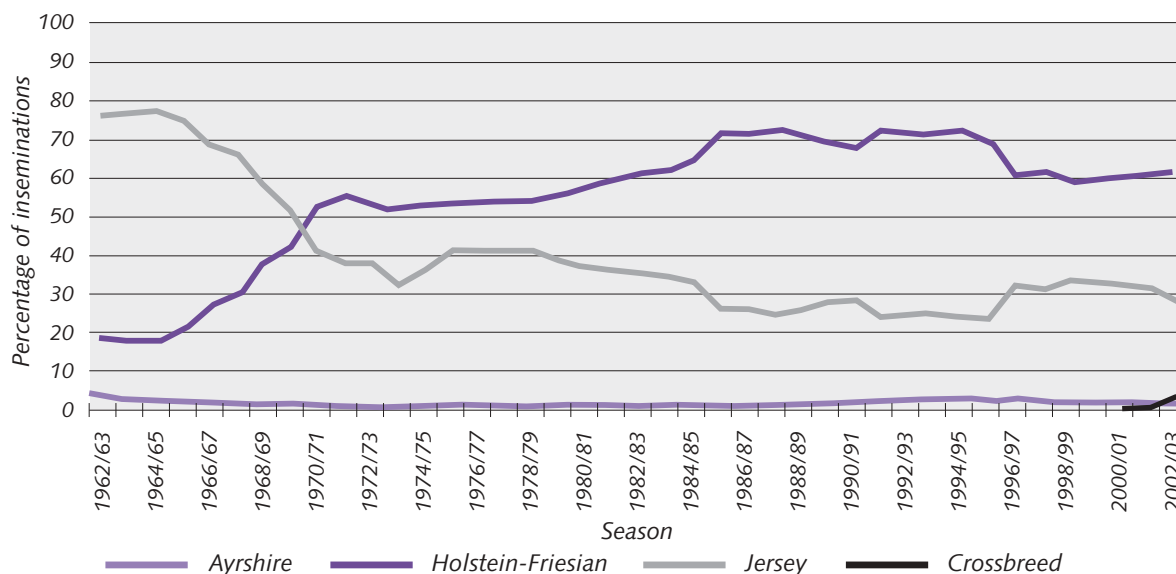


Graph 4.9 Holstein-Friesian semen usage (%) by cow breed for the last five seasons



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 Crossbreed (shown for the last two seasons) reached 3.5% for the 2002/03 season and is expected to continue to increase.

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 that 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 allow farmers to select the most profitable animals for the future.

Two types of evaluation are calculated for New Zealand dairy animals:

- Trait evaluations** are a measure 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, fertility and longevity.
- Economic evaluations** combine an animal's individual trait evaluations to measure its 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 one unit of 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:

$$\begin{aligned}
 \text{Breeding Worth} &= \text{Milkfat BV} && \times && \text{\$EV} && + \\
 & \text{Protein BV} && \times && \text{\$EV} && + \\
 & \text{Milk BV} && \times && \text{\$EV} && + \\
 & \text{Liveweight BV} && \times && \text{\$EV} && + \\
 & \text{Fertility BV} && \times && \text{\$EV} && + \\
 & \text{Longevity BV} && \times && \text{\$EV} &&
 \end{aligned}$$

where BV = Breeding Value for each trait, and

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

Animal Evaluation ranks animals in terms of their expected profit per unit of feed eaten, ie it identifies those animals in a herd that are the most efficient converters of feed into profit. 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 2003 are presented below (Table 4.9).

Table 4.9 Economic values used from 17 May 2003

	Milkfat (\$/kg)	Protein (\$/kg)	Milk (\$/kg)	Liveweight (\$/kg)	Fertility (%)	Longevity (\$/day)
Breeding Worth	1.021	6.865	-0.078	-0.915	1.659	0.033
Production Worth	1.250	6.038	-0.072	-0.892	-	-
Lactation Worth	1.263	5.712	-0.071	-0.735	-	-

Note: The economic values are reviewed annually and therefore may change from year to year.

The information for all Animal Evaluation statistics was sourced from cows and sires recorded on the Livestock Improvement Database as at 17 May 2003.

Table 4.10 shows the Breeding Values (BV) and BW by breed, of all bulls born in 1998, first proven in the 2002/03 season with a BW Reliability of 75% or greater.

Table 4.10 Average Breeding Values and Breeding Worth of 1998 born bulls (reliability of 75% or greater)

Breed	Milkfat BV	Protein BV	Milk Volume BV	Liveweight BV	Fertility BV	Total Longevity BV ^a	BW	Number of Bulls
Ayrshire	25.4	23.9	602	35.9	-6.7	-46	97.6	11
Holstein Friesian	31.7	40.5	1210	76.4	-3.1	-157	135.6	202
Jersey	25.8	15.3	78	-37.3	1.2	-25	160.5	130

^a Total Longevity is the same trait as the trait reported as Longevity in Dairy Statistics 2000-2001. It is not the same trait as the longevity measure used in calculating BW.

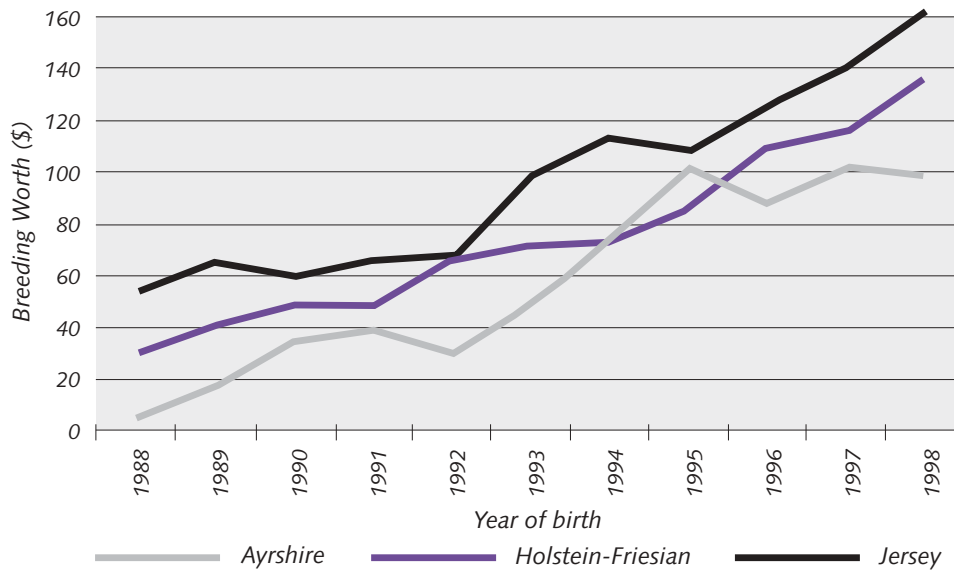
(Evaluation date: 17 May 2003)



Herd improvement – Animal evaluation

The genetic trend of proven dairy bulls is shown in Graph 4.11. Bulls born in 1998 are first proven in the 2002/03 season.

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



(Evaluation date: 17 May 2003)

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	Ayrshire	Other Breeds
1988	325	197	97	22	9
1989	379	224	117	20	18
1990	365	219	106	29	11
1991	406	261	104	28	13
1992	410	256	118	28	8
1993	391	235	117	33	6
1994	406	242	127	33	4
1995	434	258	132	37	7
1996	385	215	139	26	5
1997	372	228	120	19	5
1998	344	202	130	11	1

(Evaluation date: 17 May 2003)



Herd improvement – Animal evaluation

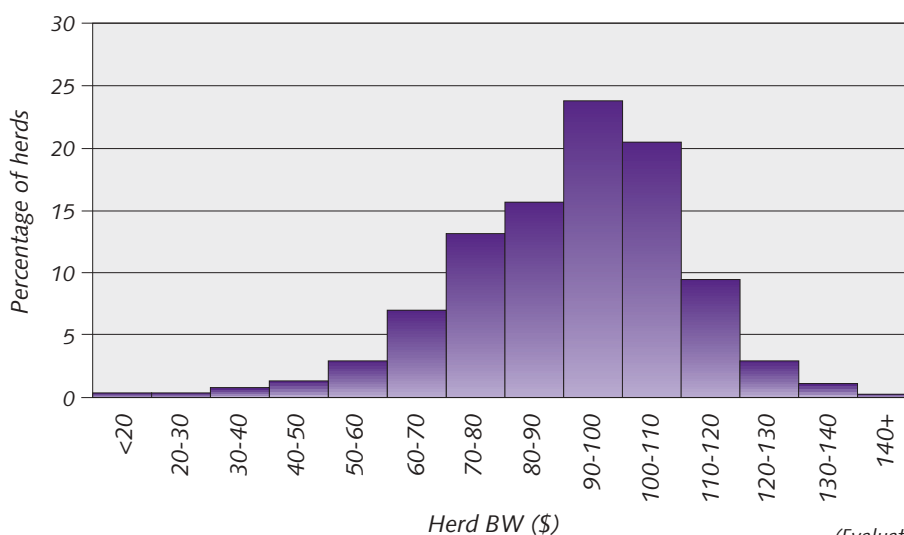
The Breeding Worth for **herds** presented below (Table 4.12 and Graph 4.12) are based on all cows recorded on the Livestock Improvement Database with a test number, in herds with at least 80 cows, and signed up for herd testing for the 2002/03 season. For example, Table 4.12 shows that 50% of New Zealand herds had a BW of 94 or above and 25% of New Zealand herds had a BW of 105 or above.

Table 4.12 Herd Breeding Worth in 2002/03

	Median	Top 5%	Top 10%	Top 25%	Bottom 25%	Bottom 10%	Bottom 5%
Herd BW	94	> 120	> 114	> 105	< 81	< 67	< 58

(Evaluation date: 17 May 2003)

Graph 4.12 Distribution of herd Breeding Worth in 2002/03



(Evaluation date: 17 May 2003)

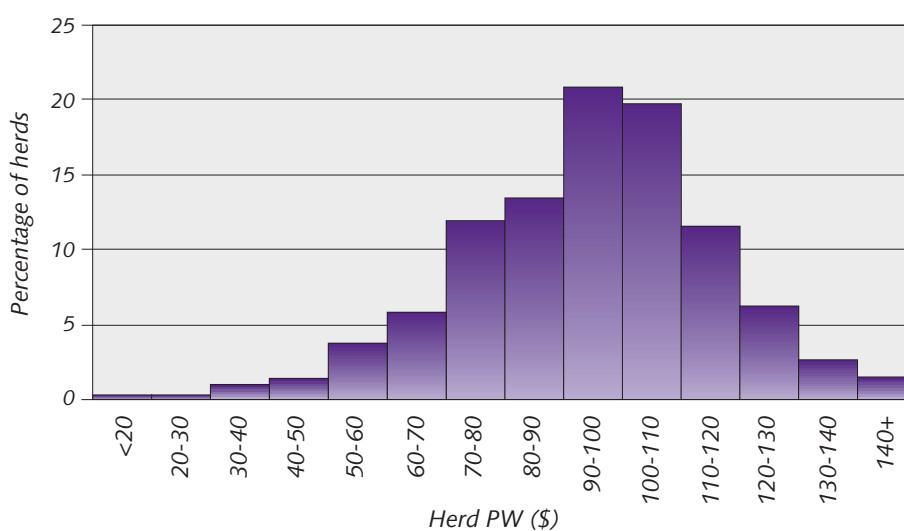
The Production Worth (PW) for **herds** (Table 4.13 and Graph 4.13) are based on all cows recorded on the Livestock Improvement Database with a test number, in herds with at least 80 cows, and signed up for herd testing for the 2002/03 season. For example, Table 4.13 shows that 50% of New Zealand herds had a PW of 97 or above and 25% of New Zealand herds had a PW of 111 or above.

Table 4.13 Herd Production Worth in 2002/03

	Median	Top 5%	Top 10%	Top 25%	Bottom 25%	Bottom 10%	Bottom 5%
Herd BW	97	> 129	> 122	> 111	< 82	< 67	< 58

(Evaluation date: 17 May 2003)

Graph 4.13 Distribution of herd Production Worth in 2002/03



(Evaluation date: 17 May 2003)



Herd improvement – Animal evaluation

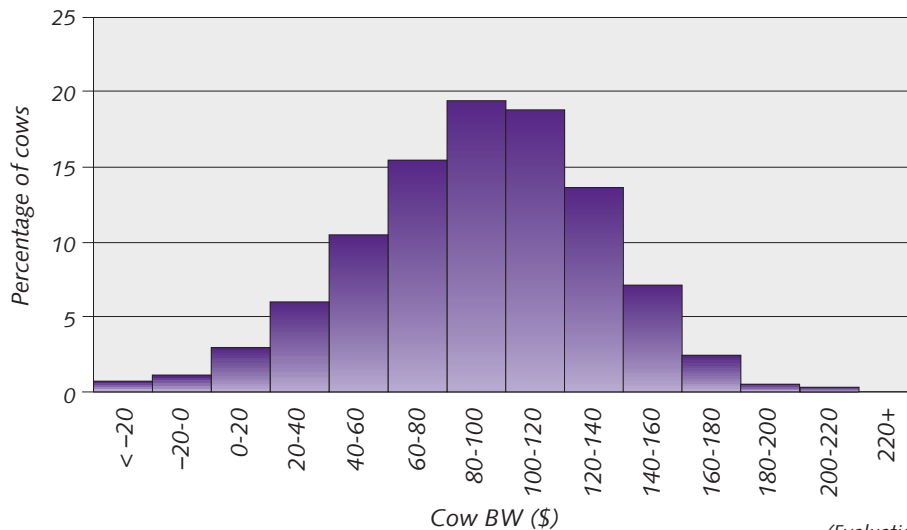
The Breeding Worth (BW) for **cows** presented below (Table 4.14 and Graph 4.14) are based on all cows recorded on the Livestock Improvement Database with a test number, in herds with at least 80 cows, and signed up for herd testing for the 2002/03 season. Table 4.14 shows that 50% of New Zealand cows had a BW of 95 or above and that 25% of New Zealand cows had a BW of 120 or above.

Table 4.14 **Cow Breeding Worth in 2002/03**

	Median	Top 5%	Top 10%	Top 25%	Bottom 25%	Bottom 10%	Bottom 5%
Cow BW	95	> 155	> 142	> 120	< 66	< 38	< 21

(Evaluation date: 17 May 2003)

Graph 4.14 **Distribution of cow Breeding Worth in 2002/03**



(Evaluation date: 17 May 2003)

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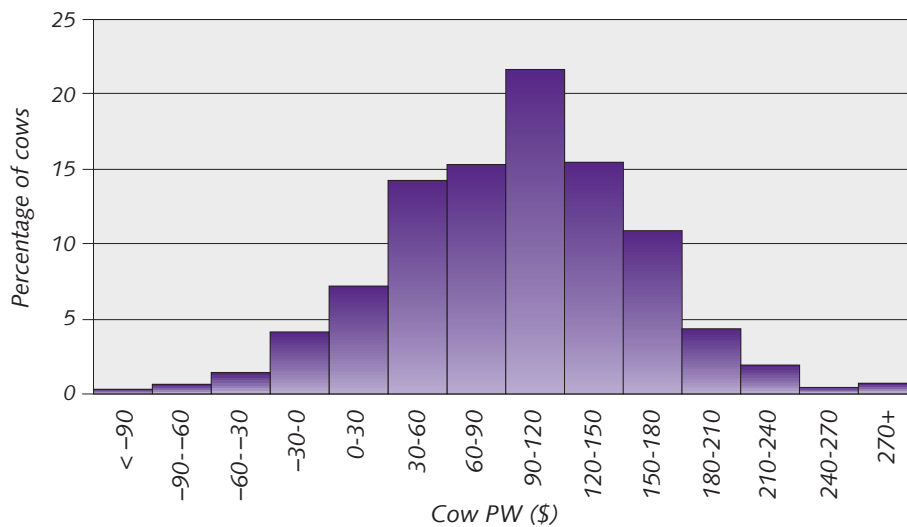
The Production Worth (PW) for **cows** (Table 4.15 and Graph 4.15) are based on all cows recorded on the Livestock Improvement Database with a test number, in herds with at least 80 cows, and signed up for herd testing for the 2002/03 season. Table 4.15 shows that 50% of New Zealand cows had a PW of 97 or above and that 25% of New Zealand cows had a PW of 136 or above.

Table 4.15 **Cow Production Worth in 2002/03**

	Median	Top 5%	Top 10%	Top 25%	Bottom 25%	Bottom 10%	Bottom 5%
Cow BW	97	> 193	> 171	> 136	< 56	< 17	< -7

(Evaluation date: 17 May 2003)

Graph 4.15 **Distribution of cow Production Worth in 2002/03**

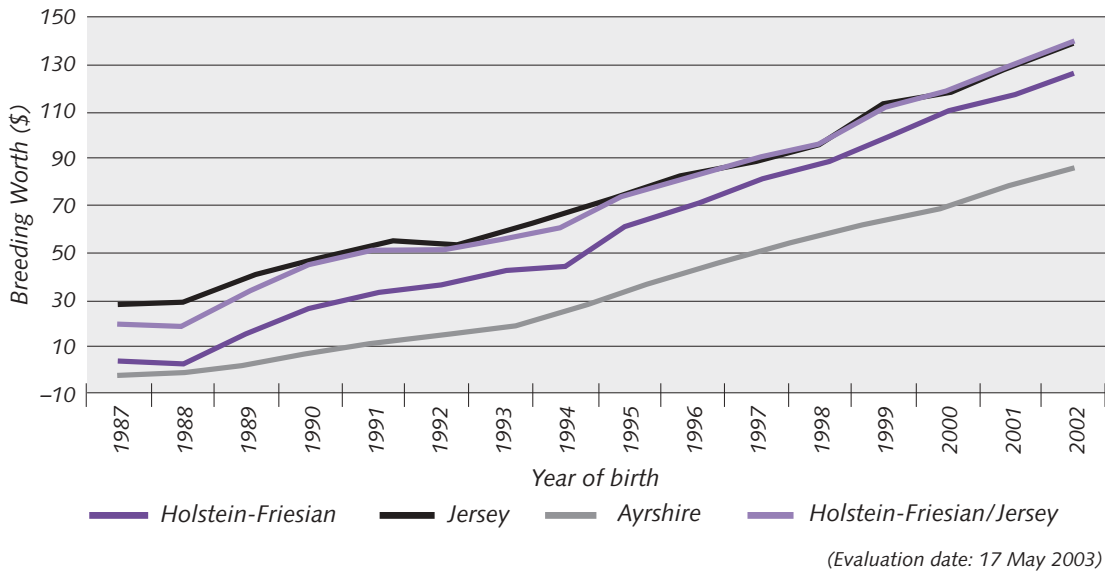


(Evaluation date: 17 May 2003)



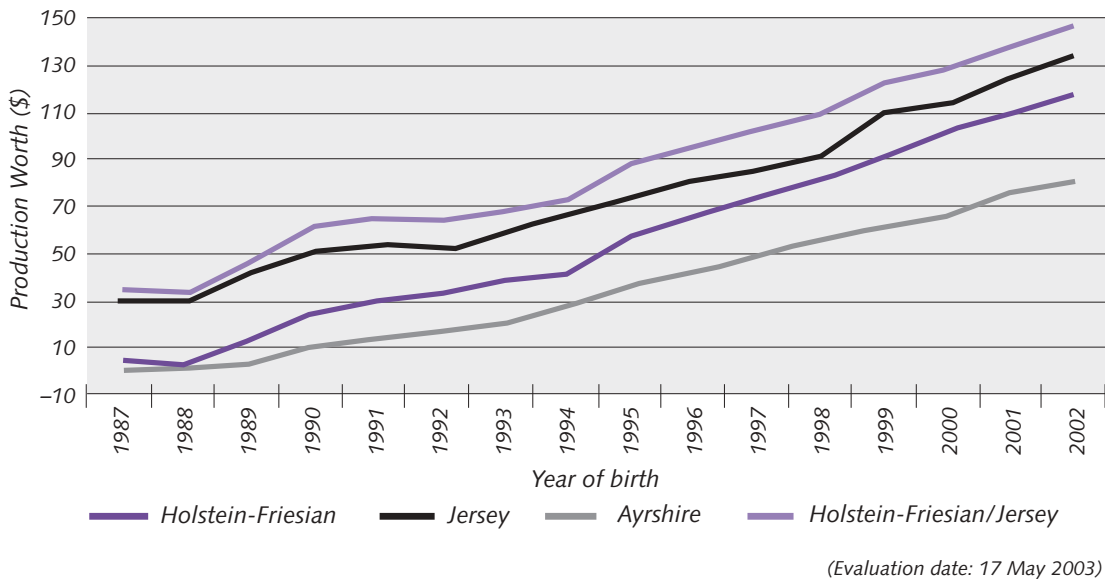
The genetic trend for cows is based on all cows (alive or dead) recorded on the Livestock Improvement Database in the 2002/03 season. Also included are the estimated BW and PW for replacement stock (2001 and 2002 born animals). All evaluations can be compared across breeds. The genetic trend for BW by breed is presented in Graph 4.16. The Breeding Worth for all breeds has increased over time.

Graph 4.16 Genetic trend in Breeding Worth for all cows in 2002/03



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 effect of heterosis (hybrid vigour) in the crossbreeds.

Graph 4.17 Trend in Production Worth for all cows in 2002/03



Herd improvement – Animal evaluation

Table 4.16 shows the average BV and BW by breed, for all 2000 born cows. The Holstein-Friesian/Jersey Crossbreed has the highest BW at 118.2. The Holstein-Friesian cows have the highest milkfat, protein, and milk volume BV. All evaluations are comparable across breeds.

Table 4.16 Average Breeding Worth and Breeding Value of all cows by breed born in 2000

Breed	BW \$	Milkfat BV (kg)	Protein BV (kg)	Milk Volume BV (l)	Liveweight BV (kg)	Fertility BV (%)	Longevity BV (days) ^a	Cow Numbers
Holstein-Friesian	110.0	29.5	30.6	928	60.4	-0.1	112	417,172
Jersey	117.5	19.3	8.2	-16	-42.0	1.4	99	127,853
Ayrshire	69.2	11.1	16.1	485	12.4	-3.1	56	9,681
Holstein-Friesian /Jersey	118.2	26.0	20.1	476	9.8	0.7	120	248,722
Guernsey	-16.2	-1.3	3.3	95	23.6	0.3	-256	152
Milking Shorthorn	8.9	-1.3	7.2	204	21.6	-1.5	-40	899
Brown Swiss	-9.5	-1.5	10.6	303	48.7	-5.0	-215	98
Other	84.3	18.0	18.0	485	18.3	-0.8	46	28,385
Weighted Average	112.1	26.2	23.4	627	27.5	0.3	109	832,962

^a Total Longevity is the same trait as the trait reported as Longevity in Dairy Statistics 2000-2001. It is not the same trait as the longevity measure used in calculating BW.

Evaluation date: 17 May 2003

Survivability is measured by the percentage of cows that have a lactation recorded for consecutive years. The 2002/03 season 2-3 years figure is the percentage of cows that were milking as two-year-olds in the 2001/02 season and are now milking as three-year-olds in the 2002/03 season. Table 4.17 shows that for the 2002/03 season the highest percentage of survival is in animals ageing from 4-5 years (86.6%), followed by animals ageing from 3-4 years (85.9%).

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

