

# USING THE NATIONAL INDEXES TO ENSURE YOU ARE BREEDING AND CUTTING THE RIGHT ANIMALS TO MAXIMISE A SUSTAINABLE BUSINESS TODAY AND TOMORROW

Greg Hamil

The benefits of genetic improvement repeat annually and cumulatively, unlike the benefits of other farm inputs that are repeated annually without progressively accumulating.

Bill Montgomerie: New Zealand Agriculture: An Economic Perspective (2014)

The herd of cows is one of the biggest assets in a dairy farm business, if not *the* biggest asset (if you are a sharemilker). If you manage your herd improvement programme well, your herd will increase in value when you come to sell it, it will be more productive each year whilst you are milking it, and it will give you more options in terms of trading stock while you are managing it.

In this workshop we are going to strip down the national indexes to bare basics. How Breeding Worth (BW), Production Worth (PW) and Lactation Worth are made up, when to use them and the financial benefits to be gained by understanding them better. How do you ensure you are breeding the best cow you can? Milking the best cow you can? Don't just farm for today, farm for tomorrow; you need to safeguard your business through volatile times.

## Indexes

We use indexes of various sorts every day. The Consumer Price Index (CPI) is used to measure inflation, the Body Mass Index attempts to take into account height and weight to measure if someone is under or over weight. Probably the most common form of an index is the stock market index which is used to describe the market and market conditions.

All indexes are similar in that they take multiple sources of data or multiple measurements and combine them to make an overall assessment of the subject or object in

---

Notes:

question. The Animal Evaluation indexes are no different. A good cow is not measured by a single trait (such as protein production). It's far more complicated than that. Is the cow fertile? Will she survive in my herd? Does she have low somatic cell counts?

## The aim of the Animal Evaluation Indexes

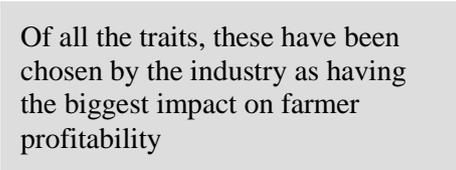
The aim of the animal evaluation indexes is to identify animals that are the most efficient at turning feed into profit. The Animal Evaluation Indexes take eight traits into account and weight them according to their contribution to profit.

The indexes (BW & PW) provide a way of comparing animals no matter what herd they are in, their age, how long they have been in milk, etc.

### **Breeding Worth**

There are now eight traits that make up breeding worth and they are:

Protein  
Milkfat  
Milk (volume)  
Liveweight  
Fertility  
Somatic Cell Count  
Residual Survival  
Body Condition



Of all the traits, these have been chosen by the industry as having the biggest impact on farmer profitability

Every bull and cow recorded with Animal Evaluation, has a value on each of these traits, called a breeding value. The 'Breeding Value' is made up of everything we know about the animals sire, dam, sons, daughters, brothers, sisters and so on as well as the animals own performance.

Breeding Worth is calculated by multiplying the Breeding value of each trait with an associated Economic Value for that trait. This is shown below for 111037 San Ray FM **Beamer-ET**.

TRAIT	BREEDING VALUE		ECONOMIC VALUE		
Protein	41.0	X	\$7.250	=	\$297.25
Milkfat	44.7	X	\$1.830	=	\$81.801
Milk (volume)	854	X	\$-0.088	=	\$-75.152
Liveweight	34.7	X	\$-1.37	=	\$-47.539
Fertility	3.7	X	\$6.840	=	\$25.308
Somatic Cell Count	0.57	X	\$-37.88	=	\$-21.592
Residual Survival	35	X	\$0.133	=	\$4.655
Body Condition	-0.02	X	\$98.40	=	\$-1.968
					<b>\$263 BW</b>

**Things to note:**

**Protein** is given a very high economic value because that is a highly valuable component of the milk.

**Liveweight** is given a negative economic value because heavier cows have to eat more just to maintain body weight

The current Economic Values (as at 16 April 2016). The breeding values are for SAN RAY FM BEAMER-ET current as at 16 April 2016 (<http://www.dairynz.co.nz/animal/animal-evaluation/bull-search/>)

### **Breeding Worth**

Breeding Worth is the industry index which ranks cows and bulls on their ability to breed profitable and efficient replacement dairy heifers. The Breeding Values for Beamer are calculated on how his daughters are currently performing in herds across New Zealand. The averages of those daughters are calculated together to give a ranking on how profitable he will be when used to breed replacements.

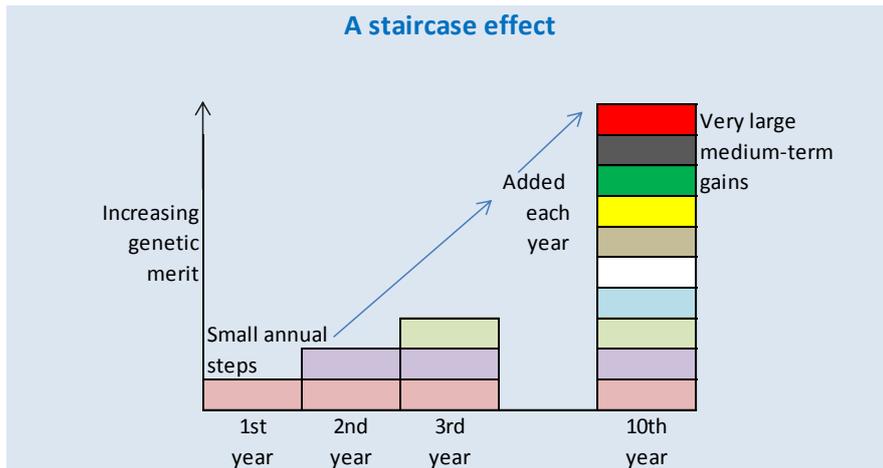
In a short term context, you can conclude; Beamer daughters are, on average expected to generate \$131.50 (half of \$263) more profit per 5.0t DM per year than the daughters of a bull with a BW of 0.

In a long term context, you can conclude that using Beamer to breed a replacement is expected to generate \$263 more profit per 5.0t DM, per year than using a bull with a BW of 0. Half you get immediately in the off spring; the extra half comes from the rest of her descendants being more profitable than the descendants of the bull with a BW of 0.

---

Notes:

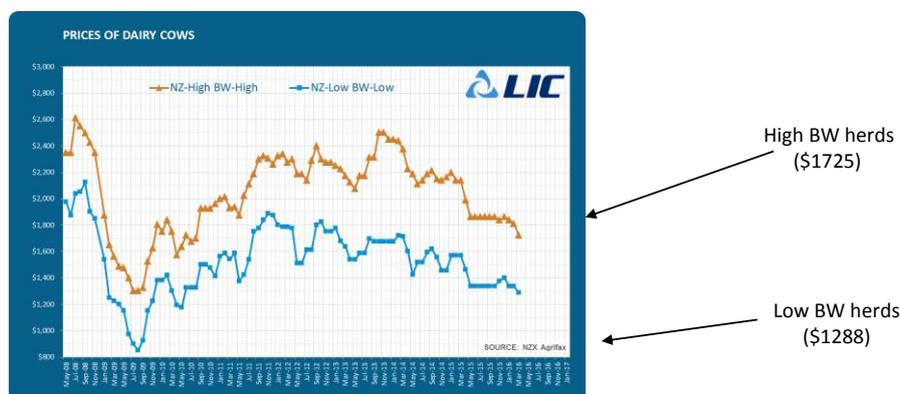
## The value of Breeding Worth



The benefits of genetic improvement repeat annually and cumulatively, unlike the benefits of other farm inputs that are repeated annually without progressively accumulating. It is calculated that 60% of on farm performance growth is from genetic gain while the other 40% comes from better fertilizers, grasses and on farm management practices.

One of the easiest ways to see the impact that genetic gain has had on dairy farms is to see what the average dairy cow is now producing compared to what they were producing 20 years ago. In the 1994/95 season the average cow produced 271kg/MS, in the 2014/15 season the average cow produced 377 Kg/MS (<http://www.dairynz.co.nz/publications/dairy-industry/>).

Higher BW animals are not only expected to leave more profitable and efficient replacements, they also have a higher capital value themselves. This is an important point as the difference in a high BW herd and a low BW herds is considerable. AgriHQ (monthly report published by NZX Rural) publish the sales price of dairy cows across the country. Their data shows that high BW herds capture over a 30% premium over low BW herds. The trend in the sales price of dairy cows is shown in Graph 1.



Graph 1

Breeding Worth ranks a cow on her expected ability to breed profitable and efficient replacements, but does not say so much about her own ability to be a profitable and efficient lifetime producer. Production Worth is the index developed specifically for this purpose.

Essentially – BW is mostly about her family and PW is mostly about the cow herself.

### ***Production Worth***

Production Worth is a measure of the lifetime producing ability of a cow.

A cow with a PW of 100 is expected to generate an extra profit of \$100 per year (per unit of feed, on average over her lifetime) than a cow with a PW of 0.

The PW is comparable across all herds, ages and breeds, so it can be used as a guide for culling and buying decisions.

Like the cow BW, PW is also based on ancestry, individual and progeny records. Cows are given Production Values (PV's) for the four individual traits of Milkfat, Protein, Volume and Liveweight and these are then combined into a PW using Economic Values (EV's).

PV's basically use the same information about a cow's ancestry, female relations and her own production as BV's do, but combine the information in a different weighting that reflects high repeatability of production performance from one season to the next. The weighting placed on a cow's own records is much greater than those for ancestry and progeny when calculating PV's. This is because PV's/PW measure the lifetime producing ability of the cow herself and not what she is expected to pass onto offspring.

The EV's used for PW are different to the EV's used for BW because their purposes are different and they are looking at a different time frame.

### **Bringing it all together**

Any good breeding programme starts with a **clearly defined objective**. So your first job is to sit down and describe the sort of cow you want to be milking in 5 years' time. If you want to breed a cow that:

- lasts a long time in your herd
- gets in calf

---

Notes:

- has good milksolids production
- has good udder health.

If these things strike a chord with you then chances are Breeding Worth is a good index for you to use to shape your breeding objective as all these traits are included in the national breeding index. You are solely responsible for what your herd will look like in 5–10 years' time. You are accountable for what you breed and what you cull.

**Select the genetics to breed** your next generation or replacements. The choice of bull is very important. Generally speaking, a cow will only breed 1 to 2 daughters for your herd *in her lifetime* (a cow will last, on average 5 lactations, and will breed a bull calf 50% of the time). Any given bull will leave you many more daughters in a single year (a 10 bull team used in a 1,000 cow herd will leave 20 to 22 daughters *each* in a *single year*).

**Measure and assess** the performance of the progeny. This is a critical part of the breeding programme. Because we are dealing with biology, not every mating will have a successful outcome. Anyone who has brothers or sisters, sons or daughters, will realise that even when the dam and sire are the same, the progeny can look and perform differently. To assist in the measurement of cow performance, herd testing services are available. Software products are also widely available which allow you to record health treatments calving dates etc – all of which will help you make your assessments of overall performance.

**Production Worth** and **Lactation Worth** are incredibly powerful indexes to use when trying to assess if a cow is performing within your system. A useful way to understand the indexes is to look at rugby players. The *life ability* of Dan Carter to produce points in rugby is second to none. If he was a dairy cow, his PW would be the highest in the national herd. However, his ability to score points *in the current season* isn't as good, therefore his LW will be low. Let's compare the current seasons Super Rugby statistics of Aaron Cruden and Beauden Barrett; Beauden will have a higher LW than Aaron Cruden, because overall his performance has been better in this current Super Rugby Season.

Aaron Cruden		Beauden Barrett	
	First-five	Position	First-five
	8	Games played	8
	605	Minutes played	623
<b>Attack</b>		<b>Defence &amp; Discipline</b>	
2		Tries	5
13		Points	100
55		Carries	59
329		Metres	445
13		Clean Breaks	11
8		Defenders Beaten	18
9		Offloads	6
9		Try Assists	4
152		Passes	241
36		Open play kicks	66
4		Lineout catches	0

Player statistics current at 25<sup>th</sup> April 2016: <http://www.nzherald.co.nz/rugby/statscentre.cfm?>

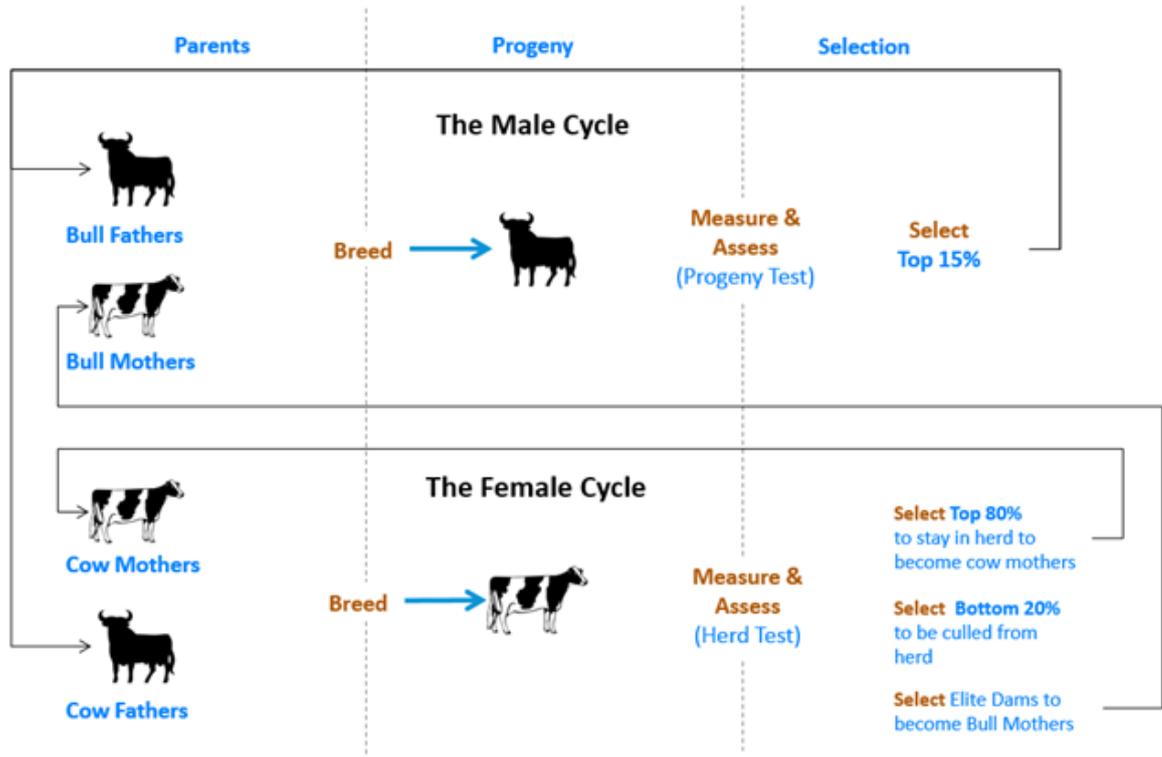
Now you are ready to **select the cows to be culled from your herd**. It's critical to select cows that have both a poor lifetime ability to perform (negative PWs) as well as poor current season performance (negative LWs). These cows should form the nucleus of any group of culled cows. There will also be other traits that will inform any selection decisions such as being empty, poor udders etc.

---

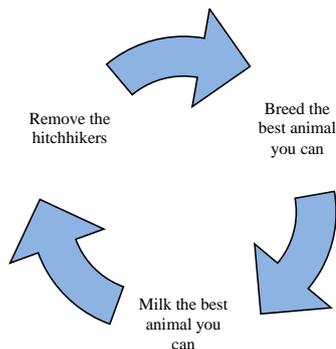
Notes:

Repeating this process each year with a clearly defined objective in mind will give you the herd you want. Genetics companies the world over use exactly the same process to select bulls for wide spread commercial use. A diagram of how this works is provided in figure 1.

### Genetic Improvement in Dairy Cattle



**Figure 1.** Genetic Improvement in Dairy Cattle, adapted from the MacDonald Committee Report 1992.



Essentially you are in control of your herd’s destiny. We will continue to see volatile times, but only you can ensure that when times are good, you have the best animals to capitalise on those times.

### Conclusion

There is an old Chinese proverb; there are two things you can be sure of in life: “The heavens will rain, and women will want to marry”.

Many things in life are unavoidable, like rain and women desiring a husband.

There are some things in life that we have no control over “like rain”, but there are also many things we can control. Spend your energy on your farm on the things you can influence.

- Breed the best
- Feed the best
- Milk the best
- Hope for the best.

The top three you can influence, the bottom you have no control over, but if you’e doing the top three well then most of the time the bottom will still be positive.

**Perseverance** – breeding good cows takes time and perseverance but the benefits are well worth it.

## Further reading

Genetic Improvement: Demystifying the black box. This can be downloaded for free from the DairyNZ website:

[http://www.dairynz.co.nz/media/796830/technical\\_series\\_july\\_2014.pdf](http://www.dairynz.co.nz/media/796830/technical_series_july_2014.pdf)

*New Zealand Agriculture: An Economic Perspective (2014)*, see Bill Montgomerie’s chapter on the contributions of genetic improvement.

Your Index, Your Animal Evaluation System - This can be downloaded for free from the LIC website: <http://www.lic.co.nz/pdf/yourindex.pdf>.

---

Notes: