

*In the following number of the magazine you will find information on how selection influences productivity conformation, udder, feet and legs; what profit can those pointers lead to and how do we earn by using reliable genetic products?*

## **Feature: Selection and Reproduction**

### **Investments in genetics guarantee high productivity of cattle farming**

#### **Dutch developments in dairy farming selection are used worldwide**

*In the January number of the Agrocompass magazine we told you about the fundamental factors of dairy farming selection. We shed light on the specific conditions of the basic animal proofs that lead to farm profit. We introduced you to the achievements of CRV, one of the leading companies for development and distribution of genetic products. This number continues with more evidence on how important the selection of sires is and how it leads to high effectiveness in dairy farming.*

### **Production Proofs**

A production proof tells you a sire's genetic potential for milk, fat and protein yields, which he will pass on to his daughters. Transmitting abilities or breeding values show how superior a bull's daughters are compared to the breed average. Since production traits have higher heritability than other traits, it is relatively easy to increase your herd's average yield by selecting sires with superior production proofs for your breeding programme.

We are going to look at the effects on the average production of Farmer John's 100-cow herd when using bulls with completely different production proofs. As example bulls we have: bull A, who is a high milk-low component sire; and bull B, who offers extreme component transmission; and bull C, who has a negative proof for kilograms of fat and protein.

Breeding values:

	Kg milk	% fat	% protein	kg fat	kg protein
Bull A	+2 527	-0,83	-0,24	+21	+61
Bull B	+574	+0,35	+0,32	+55	+47
Bull C	+320	-0,48	-0,10	-26	-1
Farmer John's herd	-151	-0,08	+0,03	-13	-3

Table 1 shows the effect on the average yield of the next generation of cows in Farmer John's herd after using the three sires right across the herd.

**Table 1: Production of Farmer John's herd as it stands and after using the three different sires across the herd**

Production	Original	Bull A	Bull B	Bull C
kg milk	8 200	9 387	8 410	8 283
% fat	4,20	3,71	4,34	3,92
% protein	3,40	3,28	3,58	3,34

<i>kg fat</i>	344	348	365	325
<i>kg protein</i>	279	308	301	277

Bull A and bull B have a positive contribution to the production of kg of milk, fat and protein of the herd. Bull C, however, has a small positive contribution to the production of kg of milk, but a negative contribution to fat and protein yields. Looking at components, bull A, who is a high milk-low component bull, will lower the percentages of fat and protein. On the other hand, high component sire bull B leaves a strong increase of the percentages of fat and protein.

### Revenues

To calculate the revenues for Farmer John when breeding for production, we calculated the effects on his farm profit when using bulls with different production proofs.

We completed two calculations for two different markets: cheese markets and liquid-milk markets. We assumed that there were no quota restrictions.

Table 2: Extra milk revenues from the next generation of cows in Farmer John's herd after using the three different sires (expressed in €)

	Bull C	Bull A	Bull B
Liquid milk market	-4 724	18 808	12 110
Cheese market	-8 429	14 701	19 690

For cheese markets, the values for milk, fat and protein were:  
€ 0.03 per kg of milk, € 3.60 per kg of fat and € 5.80 per kg of protein.

For liquid milk markets, we calculated using €0.10 per kg of milk, €2.60 per kg of fat and €2.00 per kg of protein.

We can see from table 2 that the daughters of bull B are the most profitable for Farmer John if he was operating in a cheese market. In liquid-milk markets, the daughters of the highest bull for kg of milk, bull A, will give him the highest revenues. Using bull C, whose breeding values are lower than the genetic level of Farmer John's herd, will result in a loss, regardless of the market milk is sold to.

### Profit depends on market

Although all mentioned bulls are available at CRV, the Netherlands and Flanders are predominantly cheese markets. Besides breeding for higher yields, Dutch and Flemish farmers pay a lot of attention to fat and protein in their sire selection. This can be illustrated by the progress in average production the Dutch black-and-white pedigree cows have made during the past two decades.

Table 3: Average 305-day production of the Dutch black-and-white pedigree cows by year

year	Kg milk	% fat	% protein	Kg of f+p
2008	8 750	4,26	3,44	674
2005	8 469	4,35	3,45	660
2000	8 222	4,30	3,43	635
1995	7 584	4,44	3,46	599
1990	7 122	4,42	3,43	559

1985

5 765

4,23

3,38

439

## Summary

- If you are operating in a liquid-milk market, using higher milk bulls will give you the highest revenues.
- In cheese markets, higher component sires, with high yields of kg of fat and protein, will be more profitable.
- Irrespective of which milk payment system you are on, breeding for the production that suits your system will always pay.

### **Farmer John:**

*"I take a lot of traits into account in my breeding policy. Production is one of the most important because it pays my bills"*

## Conformation

Conformation or type is associated with the show ring. Most farmers enjoy looking at beautiful cows at shows, but on their farm a beautiful cow is the cow the farmer doesn't notice. In addition to production, conformation is a factor in gaining financial profit. Farmer John, for example, wants to breed cows that are trouble-free producers and last for a long time. So he uses type proofs for his benefit. His idea of conformation is that it has to support high lifetime yields. When selecting which bulls to use, his emphasis regarding conformation is on udder and feet & legs.

### **Udder**

In order to last a long time, cows need to have a good quality udder. Farmer John selects bulls that have a good score for udder composite. However it is not only the udder composite that is important to Farmer John. He also looks at the linear traits. Most udder traits that are linear scored have a high relationship with longevity. Farmer John likes udders that are high and wide in the rear, with strong central ligaments. John is convinced that the stronger the ligaments, the longer the cows will last.

### **Feet & Legs**

A good set of feet and legs is vital in order for a dairy cow to be able to get around and feed. Foot problems result in higher vet costs and will lead to premature culling. Cows with bad feet and legs lie down more often. This results in reduced feed intake and has an impact on the total condition of the cow and her production.

Good feet and legs are vital in almost any circumstance, whether cows are housed on concrete floors in a cubicle shed or managed using a system with pasture and sometimes long distances to the milking parlour.

Good locomotion is also very important: cows with better feet and legs last longer.

Stature, or how tall an animal should be, depends a lot on the housing system you are operating. In extensive grazing systems, for example, cows that are too tall are less efficient,

while in a more intensive housing system stature is an optimum trait. Many international studies point this way, take a look at figure 3 for example: it shows that cows of intermediate size last longer.

### Summary

The requirement for good udders and feet and legs are clear, regardless of the management system you operate. Dutch and Flemish breeders like Farmer John have always actively selected for quality udders and excellent feet and legs. CRV offers a wide selection of bulls that combine quality udders and excellent feet and legs with different sizes, to breed the ideal cow that will suit your system.

### Farmer John:

*“To me, conformation is important when it supports high lifetime yields. There is a clear relationship between good udders and legs and feet and longevity, so these traits are very important in my selection process. A certain group of breeders will get financial benefit and pleasure from breeding big cows. For the average commercial producer, like me, cows of intermediate size are more profitable”*

### Reliability

#### What is reliability?

A production or type index is an estimation of the true genetic merit of a sire. Reliability tells you how accurate that estimation is.

#### Why is reliability important?

The higher the reliability, the lower the chance that a sire’s proof is going to change considerably when more information is added. Higher reliabilities will prevent unexpected disappointments.

Looking at table 4, we can see that the chance that a production proof of 1,500kg of milk with a reliability of 75% will change by 450kg or more is 23%. When we have a reliability of 95%, the chance that this proof will change by 450kg or more is less than 1%. The same applies to fat and protein.

Table 4: Relationship between reliability and the chance that a proof will change

Trait	Proof	Reliability	Chance of changing more than 450 kg of milk (30%)
Kg milk	1 500	75%	23%
Kg milk	1 500	95%	<1%

This is the reason that Farmer John prefers to use bulls with high reliability proofs to reduce the risk of failures and maximise the genetic progress in his herd.

#### What determines reliability?

The reliability of a proof is determined by the quantity and quality of the information the proof is based on. When the information from a large number of daughters is included in a sire's proof, the reliability of this proof is high. The number of herds determines the quality of this information – the more herds the better.

### What is there to gain when using reliable genetics?

Farmer John always uses sires with high reliability proofs. With low reliability proofs, the risk of financial damage is higher. If he had used a sire that did not fulfil its promise, it would have caused him financial damage in two ways:

- He spent money by investing in genetics that didn't do what they promised.
- He didn't see the desired improvement in the next generation, which will have caused him a financial loss.

We will now calculate what damage a sire could cause Farmer John if his milk proof dropped by 30%. In this scenario we are assuming that the bull's components will stay the same.

- Sire A, Proof for milk 1,500kg.

With increased reliability his proof drops by 30%, which is 450kg. Sire A passes 50% of his genetic value on to his offspring, which means that his daughters are giving 225kg less than expected per lactation.

The financial effect per daughter is  $225 \times (\text{milk price} - \text{feeding costs}) = 225 \times (0.32 - 0.07) = \text{€}56.12$  less revenue per cow per lactation.

As we have seen earlier, the chance that this scenario will happen is 23% in the case when the sire has a proof of 75% reliability. The chance would have been less than 1% if this sire had a 95% reliability proof.

### *CRV, your source of reliability*

Delta Olympic and Kian-Red, are well-known highindexing CRV sires. Olympic transmits a lot of milk and is a specialist for conformation. Kian-Red transmits high components. In addition, he is a tremendous feet and legs improver. Let's see if these bulls did what was promised (table 5 and table 6).

Table 5: Initial proof of Delta Olympic compared to his current proof

	Kg milk	Conformation
First proof 2004	1 348 (84% rel)	110 (72% rel)
Now 2009	1 279 (99% rel)	111 (99% rel)
Change	-69	+1

Table 6: Initial proof of Kain-Red compared to his current proof

	Kg milk	Conformation
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First proof 2002	261 (86% rel)	104 (79% rel)
Now 2009	438 (99% rel)	108 (99% rel)
Change	+177	+4

Delta Olympic and Kian-Red are just two examples of the importance of reliability. They were used for their strengths and combined with cows that needed improvement in these traits. This led to very good results. Had they not fulfilled their promise, one generation of genetic progress would have been lost. Farmer John has known this fact all along and used it to his advantage. By choosing reliable genetics he secured his profits in the past and will continue to do so in the future.

**Farmer John:**

*“If I invest in, for example, a tractor, I expect to have the same amount of horsepower after three years. With semen the same applies. When I invest in genetics, I go for high reliability because then I know I will get a guaranteed return on my investment.”*

**SiryX**

SiryX sexed semen offers dairy farmers across the world the opportunity to breed the next generation of milkers from the cows and heifers that offer the best genetic gain. Inseminations with SiryX semen will result in 90%, or more, heifer calves.

The sperm in SiryX sexed semen straws is made up of at least 90% X-chromosome cells. And fertilisation of an egg cell with an X-chromosome sperm cell will result in a heifer calf.

SiryX is produced in a special laboratory, owned by ST Benelux and based in Deventer, in the Netherlands, using flowcytometers. These machines are able to separate sperm cells with the female chromosome (X) from those with the male chromosome (Y). CRV is using the most advanced and developed machines available at the moment and the operators responsible for the production of SiryX have had specialist training in the USA.

**Maximum profit with SiryX**

SiryX has important advantages for dairy farmers and has the capacity to maximise farm profit in several ways:

- *Assured production of heifer calves for replacement or expansion*

The number of heifer calves born can be optimised by using SiryX. Farmers who want to expand their herd with their own stock can do this more efficiently with SiryX.

- *Reducing the number of difficult births*

Heifer calves are smaller than bull calves and by using SiryX, particularly on heifers, the number of difficult births will decrease. As a result, the heifers will have a better start to their lactation, with lower veterinary costs, and will get back in calf more easily.

- *Higher turn over*

By inseminating part of the herd with SiryX, a larger proportion of the herd can be inseminated with beef bull semen. Farmers can profit from this because they can boost their income from the sale of cross-bred calves.

- *Faster genetic progress*

Using SiryX on the highest genetic merit cattle in the herd to breed the next generation milking cows will result in faster genetic progress.

Theoretically this effect is the highest when using SiryX on heifers, due to the genetic superiority of heifers on most farms compared to the rest of the herd.

## **MRY**

For centuries the MRY has been bred in the Netherlands as a dual-purpose cow, a source of both milk and beef. Nowadays the breed is also used successfully for crossbreeding across the world. The milk has a naturally high protein content, with high AB and BB casein. Their juicy, marbled meat provides a valuable carcass at slaughter. These attributes are a welcome additional selling point – and income – for dairy producers.

- High protein
- Excellent body condition score
- Great longevity
- Excellent daughter fertility
- Very strong feet and legs
- Easy calving
- Outcross
- Perfect for three-way cross
- Super semen fertility

The conformation of the MRY cow is characterised by medium sized, powerful frames with substance of bone and an excellent slope to the rump. The MRY breed is known for its very good calving ease. The late-maturing and persistent animals vary in colour from red and white to dark red. The milk production of the MRY has improved considerably during recent years, but not at the expense of their body condition. As a breed, MRY cows have very high fertility and sires have good semen fertility.

## **Crossbreeding**

For every dairy producer in the world, fertility and health is becoming more and more important. Being persistent producers, MRY cows maintain their body condition during lactation and don't get into a negative energy balance at peak production. As there is a strong correlation between condition score and daughter fertility, the MRY breed can demonstrate the best fertility figures. The MRY breed scores better for non-return at 56 days 56 (+5%), close to 11 days better in interval between calving and first insemination, and 25 days better in calving interval, when compared to the average of the Dutch cow population.

Good fertility is a guarantee that the cow will get back in calf year after year. Furthermore, the semen fertility of MRY bulls is significantly better. Other advantages of the MRY breed are high longevity (1,312 productive days), low veterinary costs and, as an added bonus,

higher prices for calves and cull cows. MRY cows, with their above average strength, good capacity and strong feet and legs, have shown outstanding survivability in tougher conditions. All these traits make the MRY breed ideal for crossbreeding or less intensive dairying and grazing.

Currently more than 11% of all MRY inseminations in The Netherlands are used for crossbreeding black-and-white Holstein cows. Based on these figures, MRY is the third largest dairy breed in the Netherlands. Important for successful crossbreeding is the fact that MRY is free of Holstein genes, so more hybrid vigour can be expected. Producers who operate on a more low cost, extensive system, as well as those who need more strength and robustness, should consider the MRY breed as an option for crossbreeding.

### **MRY Breeding Programme**

The MRY is the third most popular breed in the Netherlands and is widely used for crossbreeding. CRV has developed a modern breeding program that has the goal to breed MRY cows that produce milk with high components, persistency and minimum of veterinary costs. CRV tests about 12 MRY sires a year. In Germany there is also a large population of the red dual-purpose breed. CRV co-operates with the German AI organisation RSH. CRV and RSH test over 20 sires a year. Since 2009 there has been joint breeding value estimation. This is unique in the world. All over the world

**with an increasing focus on health traits world-wide,**

the MRY breed is gaining popularity. Besides widespread use in the Dutch home market, there is a growing interest from many countries around the world. Semen is currently being exported to the UK, Ireland, Germany, Belgium, Denmark, Canada, the US, Luxembourg, Poland, Australia, New Zealand, South Africa, Chile, Ecuador, Colombia, Costa Rica, Mexico and many other countries.

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