Higher NTM leads to higher lifetime production for Holstein cows

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The 50 % best NTM Holstein cows within herd, produced 200-300 kg fat+protein more in their lifetime compared to cows with a lower NTM. Furthermore, the group with high NTM were superior in both functional- and production traits.

NTM

Nordic Total Merit is the common breeding goal for Holstein cows in the Nordic countries Denmark, Sweden and Finland. Selection based on NTM provides Nordic farmers with the most profitable cows by improving production, health, fertility and longevity. In this article, we have analyzed the effect of NTM by dividing cows into two halves (high and low group) within herd based on NTM at birth. In that way, we show how NTM works in practice.

Higher milk production

In Sweden, Finland and Denmark, the cows in the high NTM group were 9 - 10 NTM units superior compared to the low NTM group (table 1). For 305 days milk production, the high NTM group produced 11-18 and 20-25 kg fat+protein more in first and second parity, respectively. The production differences between the high and low NTM group were highest in Sweden. Accordingly, the high NTM group in Sweden also had the highest difference in yield indices compared to Denmark and Finland.

More fertile cows

Holstein heifers in the high NTM group had 2-3 fewer days from birth to first insemination in Denmark and Sweden, but this difference was not significant. Danish Holstein cows in the high NTM group had 3 and 2 fewer days from first to last insemination in first and second lactation, respectively. The smallest difference between the high and low NTM groups for fertility traits was in Sweden. This aligns with the smaller difference in genetic level for fertility between the high and low NTM group in Sweden compared to Denmark and Finland. This can be explained by a higher emphasis on production traits from the Swedish farmers when

they choose AI-bulls. Furthermore, the difference in production level was greatest in Sweden, and high production and fertility are negatively correlated.

Better health

The effect of mastitis is presented as percent point, where 1%-unit will correspond to one fewer case per 100 cows in a lactation. The difference between the high and low NTM groups for udder health varied between 0.3 to 2.6%-unit fewer cows with mastitis depending on country and parity. The phenotypic differences for mastitis were greatest in Finland. Accordingly, the differences in genetic level for udder health were also highest in Finland. For Denmark and Sweden there was also a favorable difference in the high NTM group for mastitis, but in Denmark this difference was not significant.

For general health, there was a favorable difference of approximately 0.5%-unit for most diseases, but some were up to 1-2%-unit (e.g. early reproductive disorders). The largest difference was for early reproductive disorders (metritis, cysts etc.) in Denmark in first and second parity. The difference in genetic level for general health was also largest in Denmark.

Higher lifetime production

Holstein cows in the high NTM group had a longer lifespan of 1.2 to 3.0 months from first calving to culling compared to the low NTM group. The higher longevity affected the lifetime production in combination with a higher production level in the high NTM group for all countries. The high NTM group produced 200-300 kg of fat+protein and 3,000-4,000 kg milk more in their lifetime in Denmark and Finland. Results for lifetime production in Sweden were not available; however, we expect a favorable difference on lifetime production in Sweden as well.

The results show that NTM works in practice and provides the Scandinavian farmers with an increased profit per cow through improved production, fertility and health. Consequently, NTM also improves lifetime production.

Fact box

The Holstein cows included in this article were born from 2007-2008 in herds with at least 30 cows born in the period for Danish herds and 15 cows for Swedish and Finnish herds. The cows where ranked into the highest and lowest half of the herd based on their parent average NTM, when they were born.

Table 1. Phenotypic performance differences between the best and lowest half PA NTM Holstein cows, born from 2007-2008 in Denmark, Sweden and Finland. Lifetime production were not available from the Swedish cattle database. PA=parent average.

	Denmark		***Sweden***		***Finland***	
	1. parity	2. parity	1. parity	2. parity	1. parity	2. parity
NTM	9.3*		9.3*		9.7*	
305 day Milk production, n[1]	*1,985*	*1,941*	*1,360*	*1,304*	*501*	*493*
• *Milk, kg*	153*	244*	199*	282*	44	183*
• *Fat, kg*	6*	9*	7*	11*	5*	11*
• *Protein, kg*	8*	11*	11*	14*	6*	10*
Calving traits, n[1]	1,944	1,927	1,334	1,311	*375*	*359*
• *Survival at birth, %-unit*	2.3*	0.1	1	0.3	0.90	-1.1*
• *Calving ease, 1-4 scale*	-0.1*	0.01*	-0.01	0.0	-0.1*	-0.05*
Fertility. heifers, n[1]	*1,845*		*1,171*		*474*	
• *Birth to first ins., days*	-2.3		-3.0		-0.4	
• *First to last ins., days*	0.0		1.1		-2.0*	
• *Number of ins.*	0.0		0.02		-0.04	
Fertility. Cows, n[1]	*1,975*	*1,968*	*1,337*	*1,310*	*507*	*507*
• *Calving to first ins., days*	-0.8	0.5	-0.5	-0.2	-1.1	-1.3
• *First to last ins., days*	-2.6*	-2.4*	-0.3	1.4	-2.0	0.2
• *Number of ins.*	-0.04*	-0.04*	0.02	0.06*	0.0	0.0
Udder health, n[1]	*1,955*	*1,942*	*1,360*	*1,341*	*501*	*501*
• *Mastitis, %-unit*	-0.3	-0.7	-1.3*	-1.4*	-2.0*	-2.6*
General health, n[1]	*1,955*	*1,942*	*1,296*	*1,247*	*498*	*498*
• *Early repro. disord., %-unit*	-2.0*	-1.1*	-0.3	-0.2	-0.4	-0.1
• *Late repro. disord., %-unit*	-0.2*	-0.1	-0.4	0.0	0.3	-0.3
• *Metabolic disord., %-unit*	-0.2	-0.4*	-0.1	-0.2	0.2	0.4
• *Ketosis, %-unit*	-0.4*	-0.7*	0.1	0.0	0.1	-0.1
• *Feet and leg disord., %-unit*	0.1	-0.4	-0.1	0.1	-0.1	0.0
Longevity, n[1]	*1,847*		*1,284*		*505*	
• *First calving to culling, months*	2.0*		1.2*		3.0*	
• *Lifetime milk production, kg*	2,959*		-		4,045*	
• *Lifetime fat+prt production, kg*	228*		-		328*	
Conformation, n[1]	*1,086*		*549*		*246*	
• *Body, classification scale*	0.2*		0.0		0.2	
• *Legs, classification scale*	0.2*		0.1		0.8*	
• *Udder, classification scale*	-0.2*		0.3*		0.8*	
• *Conformation, classification scale*	0.0		0.1		0.6*	
Indices						
• *Yield*	6.9*		8.4*		5.9*	
• *Fertility*	3.7*		0.4*		2.5*	
• *Mastitis*	2.1*		3.3*		4.5*	
• *General health*	6.1*		1.8*		3.3*	
• *Longevity*	5.3*		3.0*		4.9*	
• *Udder*	-0.7*		2.2*		3,4*	

[1]Number of herds included in calculations

* P <0,05 (significant results)