The economic value of NTM

The economic value of NTM can be used to document the value of individual breeding animals and to calculate the value of the breeding scheme. The value of one NTM unit is 9,4 € for RDC, 10,5 € for Holstein and 8,3 € for Jersey. The interpretation of these values depends on which animal you wish to look at; Is it a heifer calf, maiden heifer or a bull calf.

NTM – the Nordic total merit index

The value of a NTM unit, is defined as the yearly additional revenue from one cow. The additional revenue from a cow is generated by the cow herself and her offspring, this definition is termed an average year cow. In table 1 the economic value per unit for an average year cow is shown. The value is shown both for NTM and the sub-indices.

It is important to note that the value of an index unit reflects the genetic parameters of the trait, such as heritability, correlations and variation. The genetic parameters vary between the breeds and therefore, the economic value of an index unit is not comparable between breeds.

Table 1 - Economic value per index unit

Trait	RDC	HOL	JER
NTM	9,4	10,5	8,3
Yield	8,7	8	7,2
Growth	0	0,7	0
Female fertility	2,1	3,2	1,7
Calving, direct	1	1,5	0,6
Calving, maternal	1	1,7	0,6
Udder health	2,7	3,7	3,7
Other diseases	1	1,3	0,4
Longevity	0,6	1,3	0,7
Frame	0	0	0
Feet & legs	0,7	1,5	0,4
Udder	3,1	2,7	2,1

Milkability	0,8	0,8	0,8
Temperament	0,3	0,3	0,3
Claw health	0,4	0,8	0,4
Young stock survival	2	1,5	1

Table 1 shows that one NTM unit has a value of 10,5 € for a Holstein average year cow, whereas the value is respectively 9,4 € and 8,3 € for a RDC or a Jersey average year cow. This value is a combination of higher yield, better fertility, fewer diseases and better conformation.

In table 2 the average effect of a difference of one NTM unit on sub-indices is shown. For example Holstein bulls that are superior by one NTM unit, compared to others on average have a yield index that is 0.50 units higher, a growth index that is 0.10 units higher and so on.

Table 2 - The average difference in sub-indices by gaining one NTM unit for bulls born in 2005 or later.

Trait	RDC	HOL	JER
No. bulls	633	948	149
Yield	0.63	0.50	0.58
Growth	0.05	0.10	0.16
Female fertility	0.16	0.38	0.32
Calving, direct	0.20	0.34	0.10
Calving, maternal	0.13	0.22	0.40
Udder health	0.34	0.56	0.52
Other disease	0.23	0.47	0.20
Frame	-0.04	-0.11	0.17
Feet & legs	0.28	0.21	0.17
Udder	0.22	0.29	0.13
Milkability	0.16	-0.04	0.14

Temperament	0.05	0.03	0.10
Longevity	0.62	0.70	0.64
Claw health	0.16	0.36	0.08
Young stock survival	0.31	0.25	0.22

There is a relationship between the direct value of a NTM unit (table 1) – e.g. 10,5 € for Holstein – and the value for the single traits (table 1), multiplied with the change in sub-index by gaining one NTM unit (table 2). The value of a gain of one NTM unit for yield in Holstein is for example: 0.50 yield index units x 10,5 €/index unit = 5,25 € If the values are summed over all the traits in NTM, the value is the same as the direct value of NTM.

Value of NTM at animal- and herd level
To illustrate the value of NTM for different animal groups, examples of the calculated value of NTM for a newly born heifer calf, a newly born bull calf and a maiden heifer is shown in the following section. In the examples the effect of a difference of 10 NTM units between two animals is shown. It is assumed that contributions to NTM reflect the average for the breed (table 2). Furthermore, the value of NTM on herd level is shown.

The economic value of a NTM unit for a maiden heifer
All traits, except growth are expressed in females. The value of a NTM unit is shown in table 1. An average dairy cow has a productive life of 2.4 lactations. This means that the additional revenue for a difference of 10 NTM units in maiden heifers throughout their lifespan is:

RDC:
€/maiden heifer = 2.4[1] x 10 NTM units x 9,4[2] €/NTM unit = 226 €

HOL:
€/maiden heifer = 2.4[1] x ((10 NTM units x 10,5[2] €/NTM unit) – (0.10[3] growth/NTM x 10 NTM x 0,7[4] €/growth)) = 251 €

Jersey:
€/maiden heifer = 2.4[1] x 10 NTM units x 8,3[2] €/NTM unit = 199 €

[1] Average number of lactations for a dairy cow
[2] The value of a NTM unit in table 1
[3] Number of growth units that are obtained by an improvement in NTM of one unit in table 2
[4] The value of a growth unit in table 1

Growth is only expressed in bull calves. For Holstein the economic value of NTM is corrected for the value of growth. The reason for this is that Holstein puts weight on growth in the breeding goal.

Economic value of a NTM unit for a newly born heifer calf
The value of NTM is constant, regardless if it is expressed in a generation of newly born heifer calves, or at a later time where the same generation become maiden heifers. Some of the newly born heifer calves die or are culled before they calve for the first time. This means that the average value of a NTM unit for a newly born heifer calf is less than that of a maiden heifer (the heifer calves that die or are culled do not express their breeding potential).

On average about 80 % of the newly born heifer calves have a calf. This means that the additional revenue from a difference of 10 NTM units for newly born heifer calves throughout their lifetime is:

RDC:
€/heifer calf: 226[1] x 0.8[2] = 181 €

HOL:
€/heifer calf = 251[1] x 0.8[2] = 201 €

Jersey:
Kr./heifer calf = 199[1] x 0,8[2] = 159 €

[1] The value of a maiden heifer calculated in the previous section
[2] Percentage of newly born heifer calves that give birth

The economic value of NTM for a newly born bull calf
For bull calves it is only growth that has an economic value in NTM. For Holstein the growth index on average increases with 0.10 units every time NTM increases by one unit (table 2). For RDC and Jersey the economic value of growth is equal to zero (see table 1). This means that the additional revenue from a difference of 10 NTM units for newly born RDC and Jersey bull calves is equal to zero. The additional revenue from a difference of 10 NTM units for newly born bull calves is:

RDC:
€/bull calf = 0

HOL:
€/bull calf = 0.10[1] growth index units/NTM x 10 NTM x 0,7[2] €/growth= 0,7 €

Jersey:
€/bull calf = 0

[1] Number of growth index units that are obtained by an improvement of 1 NTM unit in table 2
[2] The value of one growth index unit in table 1

Economic value of NTM for a herd with 150 average year cows

The value of NTM can also be expressed at herd level. The economic annual additional revenue for a difference of 10 NTM units between two herds with 150 average year cows is:

RDC:
€/herd = 9,4 €/NTM unit[1] x 10 NTM units x 150 cows = 14 100 €

HOL:
€/herd = 10,5/NTM unit[1] x 10 NTM units x 150 cows = 15 750 €

Jersey:
€/herd = 8,3/NTM unit[1] x 10 NTM units x 150 cows = 12 450 €

[1] The value of a NTM unit in table 1