



The economic value of NTM

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Rule of thumb – the value of 1 NTM unit

Value per cow year	9 €
Value of AI sire on progeny (conv. semen)	6 €
Value of heifer at first calving	27 €

The economic value of NTM

The economic value of NTM is calculated for different purposes, for example to document the value of breeding stock or the value of different breeding programs. This note presents the economic potential (value of NTM) for different groups of female animals. Here the value of progeny or animal is expressed as the expected production value of having higher NTM of this progeny or animal at a certain time point of the animal's life cycle. This means that the improved production value in future generations is neglected. Furthermore, the production values of the animals are non-discounted values. When comparing the value of two animals, the animals should be at approximately similar ages.

It should be emphasized that the economic value of NTM depends on the assumptions used for calculating the economic value for each trait that is included in NTM ([NTM 2018 Report](#)). However, the economic value of NTM is quite robust with respect to changes to assumptions.

Definition

The economic value of NTM is defined as the additional income per year per cow (or annual cow) per NTM index unit and is shown below. For translating between Euros and Danish and Swedish kronor, exchange rates of 7.5 and 10 are used for DKK and SEK, respectively.

Economic value (in €) of one NTM index unit per annual cow for Holstein, RDC and Jersey are based on average production circumstances behind the revised NTM. Details can be found in: [NTM 2018 Report](#)

	HOL	RDC	JER
Euros per NTM unit	9.9	9.2	8.0

Value of NTM in a herd with 150 cows as production animals

The annual added economic value of a difference of 10 NTM units between two herds with 150 annual cows. The economic value that is transferred to subsequent generations (progeny of the cows) is not included.

HOL: 10 NTM units × 9.9 €/NTM unit × 150 cows	= € 14,850 (DKK: 111,500; SEK: 148,500)
RDC: 10 NTM units × 9.2 €/NTM unit × 150 cows	= € 13,800 (DKK: 103,500; SEK: 138,000)
JER: 10 NTM units × 8.0 €/NTM unit × 150 cows	= € 12,000 (DKK: 90,000; SEK: 120,000)

Value of NTM for new-born heifer calf as production animal

From the assumptions used to calculate the economic value of each sub-index in NTM, the value of a new-born heifer calf can be calculated. The assumptions are a yearly preplacement rate of 32% and an average calving interval of 13.5 month corresponding to 2.8 lactations for a heifer calving the first time. The calculations are similar to the calculations used for a heifer at first calving (see next section) with a few exceptions.

- Not all new-born heifers will reach first calving; thus, the average number of lactations per new-born heifer will be lower than the average number of lactations per cow. Approximately 85 % of heifers reach first calving; thus, the average number of lactations per new-born heifer calf is 2.4
- The average production time is then $2.4 \times (13.5/12) = 2.7$ years
- The female part of the economic value for young stock survival accounts for approximately 2/3 of the total economic value of the young stock survival index.
- Male growth is not expressed in females; value = 0

The economic value that is transferred to subsequent generations (i.e. offspring of the calf) if the heifer calf reaches first calving is not included. The values below are for comparing the economic value of two new-born heifers with NTM of 0 and +10, respectively.

Formula for calculating value of new-born heifer with an NTM value of +10:

HOL: 2.7 production years × 10 NTM units × 9.4 €/NTM unit	= € 254 (DKK: 1,905; SEK: 2,540)
RDC: 2.7 production years × 10 NTM units × 8.7 €/NTM unit	= € 235 (DKK: 1,760; SEK: 2,350)
JER: 2.7 production years × 10 NTM units × 7.9 €/NTM unit	= € 213 (DKK: 1,600; SEK: 2,130)

Value of NTM for heifer at first calving, as production animal

Assumptions:

- Average number of lactations per cow: 2.8 (NTM 2018)
- The average calving interval is 13.5 month
- The average production time is then $2.8 \times (13.5/12) = 3.15$ years
- Male growth is not expressed in females; value = 0
- Young stock survival already expressed when heifer reaches first calving; value = 0

Formula for calculating value of heifer at first calving with an NTM value of +10:

HOL: 3.15 prod. years × 10 NTM units × 9.1 €/NTM unit	= € 287 (DKK: 2,150; SEK: 2,870)
RDC: 3.15 prod. years × 10 NTM units × 8.3 €/NTM unit	= € 261 (DKK: 1,960; SEK: 2,610)
JER: 3.15 prod. years × 10 NTM units × 7.6 €/NTM unit	= € 239 (DKK: 1,795; SEK: 2,390)

The economic values shown above are based on the assumptions behind NTM, i.e. based on average production circumstances. In herds with better longevity than the 2.8 lactations the economic value will be slightly higher and vice versa for herds with lower longevity.

Economic effect of AI sire on the progeny as production animal

The economic value of NTM when semen from an AI bull with a NTM value of +10 is resulting in a liveborn calf. The first multiplication by 0.5 expresses that only half the value of the sire is transferred to progeny. The value is expressed for a new-born calf with unspecified sex, i.e. only 50% of the calves are expected to be female. In these calculations the very small economic value originating from the bull calves are ignored. The economic value that is transferred to subsequent generations (progeny of progeny) is not included.

HOL: $0.5 \times 10 \text{ NTM units} \times 9.4 \text{ €/NTM unit} \times 0.5 \times 2.7 = \text{€ } 63$ (DKK: 475; SEK: 635)

RDC: $0.5 \times 10 \text{ NTM units} \times 8.7 \text{ €/NTM unit} \times 0.5 \times 2.7 = \text{€ } 59$ (DKK: 440; SEK: 590)

JER: $0.5 \times 10 \text{ NTM units} \times 7.9 \text{ €/NTM unit} \times 0.5 \times 2.7 = \text{€ } 53$ (DKK: 400; SEK: 535)

The economic effect of AI sire on progeny changes if sexed semen is used. Assuming that 90 % of calves born after sexed semen are heifers, the economic value transferred to progeny is equal to $0.9 \times \text{economic value per NTM unit for a new-born heifer}$ (again ignoring the value of a bull calf. The results from using sexed semen are:

HOL: $0.5 \times 10 \text{ NTM units} \times 9.4 \text{ €/NTM unit} \times 0.9 \times 2.7 = \text{€ } 114$ (DKK: 855; SEK: 1140)

RDC: $0.5 \times 10 \text{ NTM units} \times 8.7 \text{ €/NTM unit} \times 0.9 \times 2.7 = \text{€ } 106$ (DKK: 795; SEK: 1060)

JER: $0.5 \times 10 \text{ NTM units} \times 7.9 \text{ €/NTM unit} \times 0.9 \times 2.7 = \text{€ } 96$ (DKK: 720; SEK: 960)

These values may be used for determining if it is worth paying for a conventional or sexed semen dose, respectively.

General comments

Regarding the calculations for new-born heifer calves and heifers at first calving, we assume that male growth and young stock survival (only for heifers at first calving) is not expressed. This is only true when we look at the specific value of the heifer. The value of these two traits is of course transferred to subsequent generations. One could argue that some proportion of the value of these two traits should be retained because a heifer will have 2-3 offspring or more. However, for comparison of two heifers (for example) this is not necessary, and the calculations are not straightforward.