Beef semen

November 2025

Beef semen creates opportunities for both milk producers and beef producers. Beef producers will earn profit from heavier calves, compared to dairy bull calves. For milk producers, there are benefits from selecting genetically inferior cows for beef semen and thereby assure that heifer calves are only born from the best part of the cows in the herd. In addition, beef semen can be used to minimize the excess of heifers, thus saving costs of raising heifers.

In the example used, the goal is to minimize the number of excess heifers. In Step 1-3, you will be guided through the setup of the scenario and understanding some of the key results. In further (optional) steps, you will get tips on how to combine beef semen and sexed semen.

Step 1: create herd and scenario

Create your own herd or choose a template. Create a scenario, find the category "Breeding strategy" and unfold the header "Beef semen". Set the three parameters for beef semen use in cows to 30% (0.3) as below. This is indeed an arbitrary value – it will be explained in the next step.

Run the scenario.

Step 2: calibrate the use of beef semen to fit the herd dynamics

The SimHerd model does not know the optimal use of beef semen. Therefore, we need to calibrate the scenario until we get satisfied with the number of excess heifers. Hence, 30% was our starting point.

Check the results of your scenario by clicking the three dots (…) next to the scenario and choose "View results". Unfold the table "Herd dynamics" and check the "Number of sold heifers". As a rule of thumb, the number of heifers sold should be between 1 and 3 heifers per 100 cows to keep the herd in balance.

- If the number is less than 1-3 heifers per 100 cows – reduce the amount of beef semen in the scenario
- If the number is more than 1-3 heifers per 100 cows – increase the amount of beef semen in the scenario

It may take several tries, until you get the reasonable amount of beef semen in the scenario.

In the example case below, the target number of excess heifers is between 3 and 8. With 30% of beef semen, it resulted in 9 excess heifers. The following calibration with 35% beef ended with 7 excess heifers, which is within the target.

Herd dynamics

| Beef	STANDARD	SCENARIO	DIFFERENCE
Number of cow-years	250	250	0
Number of calvings	286	280	-6
Replacement rate	31.6	29.9	-1.7
-Number of Involuntary Cullings incl. mortality	47	47	-1
-Number of Voluntary Cullings	32	28	-4
Number of productive years per cow	3.2	3.3	0.2
Lifetime production, kg ECM	36444	38495	2051
Stillbirth, %	5.9	5.9	0.0
Calf mortality, after birth, %	6.2	6.3	0.1
Number of alive born bull calves	139	106	-32
Number of alive born crossbred-calves	0	58	58
Number of bought heifers	0	0	0
Number of sold heifers	31	9	-22

Step 3: understanding the results

When you have calibrated your scenario, you can check the results again.

Is the economic benefit negative?

If there is a loss in GM by using sexed semen it is likely because the cost of raising heifers is low compared to the price of selling excess heifers. The standard costs for heifers in SimHerd are without labor costs and capital costs.

You can go back and edit the prices in your scenario, by clicking "Check prices" in the bottom of the window. Find "Other" and adjust the "Other costs per heifer-year".
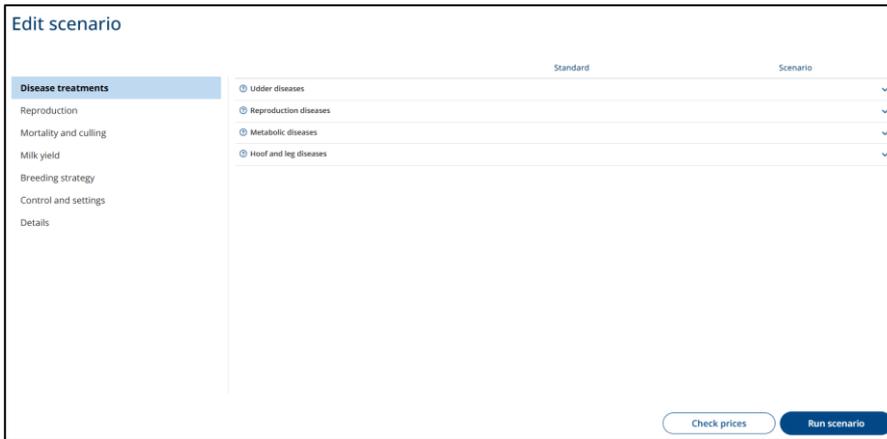
The increase needed is country- and herd-specific. In average Danish herds, this price usually needs to be 5x than the standard price, to cover labor and capital costs related to young stock.
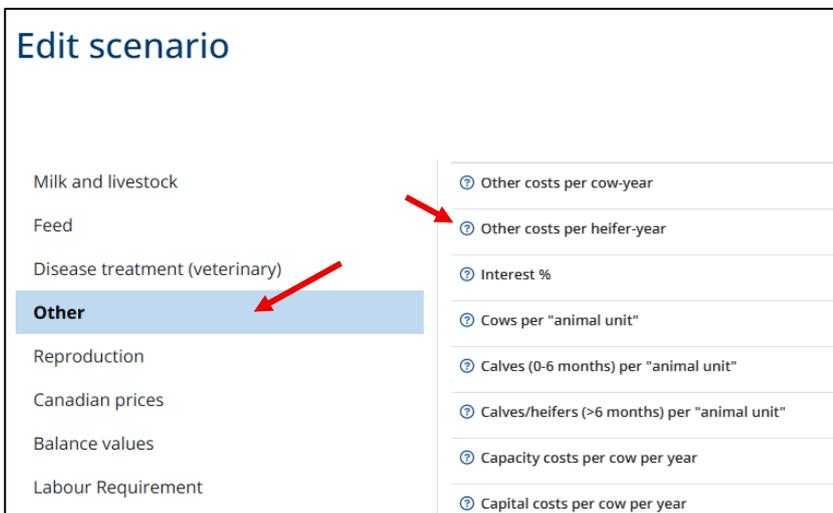
Why is there a (small) decrease in milk yield?

You may notice and wonder why the milk yield decreases when beef semen is used in the herd. The result you get from SimHerd is a snapshot of the average 365 days during the last 5 years of simulation. Check the table "Herd dynamics" and look at the replacement rate. This one will also be decreasing. When beef semen is used to minimize the excess of heifers, it means that the herd won't cull cows voluntarily because there is a heifer pushing to enter the herd. Compared to the standard herd, the average cow in the scenario will therefore a little further down the lactation curve. There will also be fewer calvings, and the cows will on average be older. In other words, there are, in 365-day time frame fewer cows in peak lactation (high daily yields), more cows towards the end of lactation (low daily yields) and more older cows (low daily yields at the end of lactation).

What about genetic progress?

The results in SimHerd are a balanced steady-state situation – meaning if nothing else changes, this is what the herd will look like after the scenario changes have stabilized. Thus, genetic progress is NOT simulated. However, the value of genetic progress by using beef semen is calculated in the results. Check the tables "Value of genetic progress" and "Value of genetic progress per cow-year in different periods".

In the example below, the value of genetic progress per cow-year between year 5 and 10 is 61 DKK, and corresponds to the value of the expected genetic improvement per cow.

Value of genetic progress

Beef	DIFFERENCE
Difference in GM per year (excl. genetic progress)	Kr 87,552
Difference in GM per year (incl. genetic progress)	Kr 102,859
Value of genetic progress per year	Kr 15,307
Diff. in GM per cow-year (excl. genetic progress)	Kr 405
Diff. in GM per cow-year (incl. genetic progress)	Kr 466
Value of genetic progress per cow-year	Kr 61

Value of genetic progress per cow-year in different periods

Beef	DIFFERENCE
Average in simulation years 1 to 5	Kr 12
Average in simulation years 6 to 10	Kr 61
Average in simulation years 11 to 15	Kr 77
Average in simulation years 16 to 20	Kr 82

Step 4 (optional): better selection of cows

In the first steps, we used 35% beef across all parities. If you are a breeding specialist, you will already know that younger cows are in theory genetically better than older cows. And from that theory, it would be better to select the oldest cows and let the younger cows produce heifers.

You can easily do this by calibrating beef semen in the scenario starting from the oldest cows. In the example herd, the end result of calibration was 70% beef semen on parity 3+ cows only. The value of genetic progress increased to 151 DKK per cow-year compared to 61 DKK in the previous scenario.

ⓘ Beef semen use, 1. parity cows	0	proportion, between 0 and 1	0
ⓘ Beef semen use, 2. parity cows	0	proportion, between 0 and 1	0
ⓘ Beef semen use, 3+ parity cows	0	proportion, between 0 and 1	0,7

Step 5 (optional): combining and calibrating with sexed semen

If you want to advance further and use sexed semen on heifers (and maybe the youngest cows) you can easily add that to your scenario. You will find those parameters in the "Breeding strategy" category by unfolding the "Sexed semen" header.

Remember to set the "Number of inseminations with sexed semen on heifers" (and cows, if necessary). Normal practice is 2. This number determines how many chances the heifer or cow gets to become pregnant with sexed semen, whereafter she will be inseminated with conventional semen. This chance is determined by the herd input on conception rate, and the relative conception chance of sexed dairy semen (standard is 90%).

Sexed semen enhances the chance of heifer calves, and therefore we need to increase the use of beef semen as well to keep the minimum of excess heifers. **This may again take a few re-simulations to calibrate** the reasonable amounts of sexed and beef semen.

In the example case, using 100% sexed semen in heifers required 60% beef semen in cows, to keep the excess heifers at the same minimum as with only 35% beef semen.

ⓘ Sexed semen use, heifers	0	proportion, between 0 and 1	1
ⓘ Number of inseminations with sexed semen on heifers	0	number	2

ⓘ Beef semen use, 1. parity cows	0	proportion, between 0 and 1	0,6
ⓘ Beef semen use, 2. parity cows	0	proportion, between 0 and 1	0,6
ⓘ Beef semen use, 3+ parity cows	0	proportion, between 0 and 1	0,6

Step 6 (optional): using sexed beef semen

Some beef producers may not be interested in buying beef cross heifers. Therefore, you may want the option of using sexed beef semen to increase the amount of bull calves. You can find the relevant parameters for that in the "Breeding strategy" category, by unfolding the "Beef semen" header. In the example below, these parameters are set to 0.5, which means that half of the cows inseminated with beef semen will be inseminated with sexed semen. However, the relative conception chance (to unsexed dairy semen) is lower. Increased number of beef bulls born is also associated with higher risks of dystocia and stillbirth.

ⓘ Proportion of beef semen that is sexed beef semen, 1. parity cows.	0	proportion	0,5
ⓘ Proportion of beef semen that is sexed beef semen, 2. parity cows.	0	proportion	0,5
ⓘ Proportion of beef semen that is sexed beef semen, 3+ parity cows.	0	proportion	0,5
ⓘ Relative conception chance of sexed beef semen	0.86	proportion	0,86