

SimHerd exercises - solutions

SimHerd A/S, August 2025

NOTE: because of the stochasticity of the model, the results marginally differ between simulations. I.e., the answers below may differ insignificantly from your simulations with the same input.

Exercise 1: What if the occurrence of lameness is reduced?

Answer the following questions:

- a) How much does the milk yield change?

+141 kg ECM per cow-year

- b) Is it mostly older cows or first parity cows that increases milk yield when lameness is reduced? (you will find the answer in the table [Milk yield, feeding and methane production](#)) – why?

Older cows have 0.5 kg higher daily milk yield within first 24 weeks, while younger cows only increase with 0.3 kg. This is because older cows are often more prone to diseases and thus they are benefitting the most when the risk of lameness is reduced.

- c) The cows can be culled voluntary or involuntary (incl. cow mortality). Find the numbers in the table [Herd dynamics](#))

- a. How many cows are involuntarily culled in the standard vs scenario?

-3 cows

- b. How many cows are voluntarily culled in the standard vs scenario?

0 cows

- c. Explain the difference between the two types of culling and why they change when the lameness occurrences changes

Cows are culled involuntary often due to diseases or voluntarily if they are low-producing and fail to become pregnant in due time. When the occurrence of lameness decreases, fewer cows will be culled due to lameness. That may create room for culling cows voluntarily (if there are calving-ready heifers available).

- d) What happened to the occurrence of mastitis (the table [Disease treatments per 100 cow-years](#))? Why?

Hint: check the figures in the table [Herd dynamics](#)

Mastitis occurrence increases with 1.6 treatments per 100 cows. This is because there are more older cows in the herd now, and older cows tend to get more mastitis.

- e) How much does the contribution margin change?

+€19,227 per year and +€93 per cow-year

Exercise 2: What if the heat observation rate increases?

Answer the following questions:

- a) What happens with the replacement rate (table [Herd dynamics](#))? and why?
The replacement rate decreases with 5.6%-units. This is because more cows get pregnant within the timeframe of inseminations, and therefore fewer cows goes on the culling list. It also means that 13 more heifers are sold!

- b) Try to explain why the number of dry cows increases (table [Animals in different categories](#)). NOTE it is **NOT** because the cows get a longer dry period!!
There are 2 more dry cows in the herd. The number of dry cows increases, because more cows get to stay in the herd and have another calving instead of being replaced with a heifer.

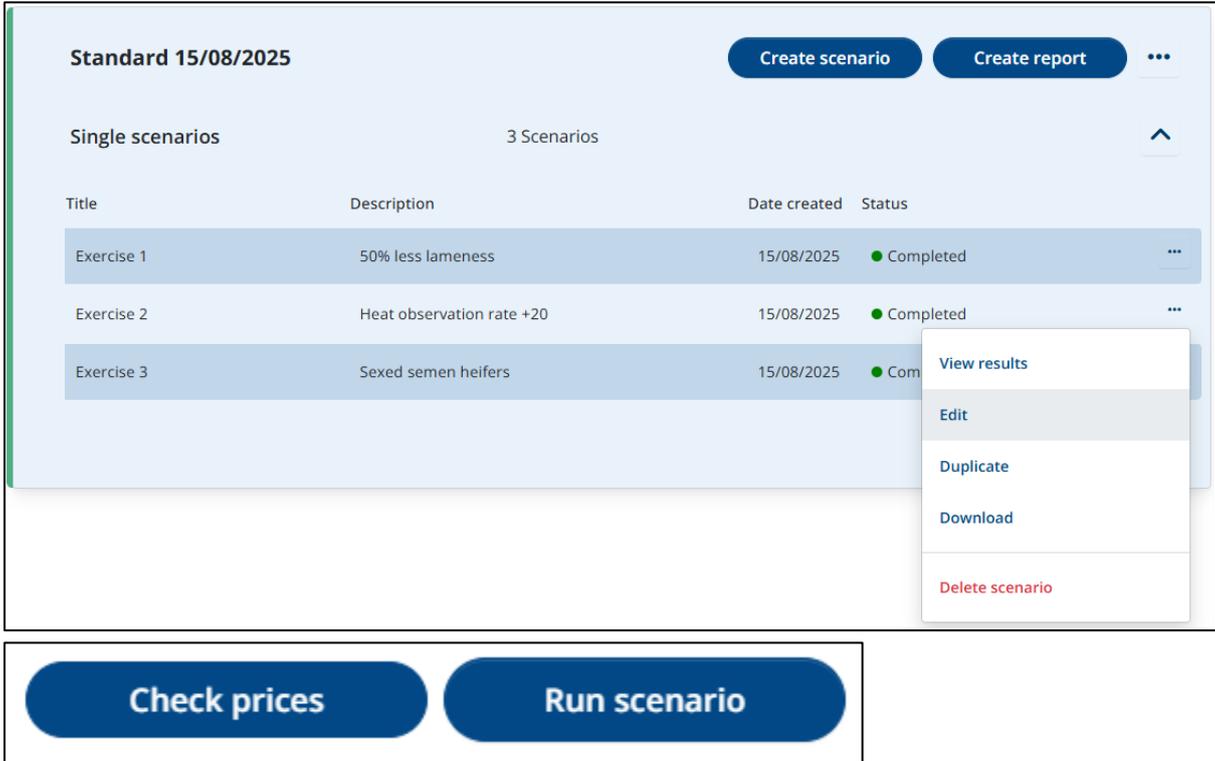
- c) Increasing the heat observation rate can have multiple effects on milk yield – some positive and some negative. The results present you with the *overall effect*, reflecting the combined influence of both the positive and negative effects. Look at the figures in the tables [Herd dynamics](#), [Disease treatments per 100 cow-years](#) and [Animals in different categories](#):
 - 1) Identify 2 aspects (differences between the *scenario* and the *standard*) that have a **positive effect** on milk yield.
 - i. *more calvings (and/or shorter calving interval)*
 - ii. *more older cows (due to lower replacement rate)*
 - 2) Identify 2 aspects that have **negative effect** on milk yield.
 - i. *more diseases (because of more calvings and older cows)*
 - ii. *more dry cows = fewer cows are milked every day of the year (notice how much milk yield per cow-year (milking days) increases; this is an expression for the milk yield where the dry cows are not included!). This expression is not an economically interesting figure, since economic performance should be measured based on all cows, not just the lactating ones.*

- d) How much does Gross Margin change per year? Positively or negatively? (in the first table of the report, [Change in contribution margin per year](#))
-€1,549 per year and -€11 per cow-year

- e) What are the most relevant changes in revenues and expenses? (tables [Revenues](#) and [Expenses](#)). Can you pinpoint some prices/costs that will have large impact on the results?

Because of the lower replacement rate, there is a major loss in revenue from slaughter cows (-€15,796). Though, this loss is covered by the larger income from selling surplus heifers. However, there are some major cost increases from 1) feeding more high yielding (older) cows, 2) feeding the excess heifers until they are sold as calving-ready heifers, and 3) more disease treatments due to more older cows in the herd.

In this case, the price received for heifers is probably the largest economic factor. Higher milk prices and lower feed costs usually have large impact as well, but in this case, they may need to change drastically, because the milk yield is the same in both standard and scenario. You can always play around with the prices by editing your scenario and changing the prices as shown below.



The screenshot shows the SimHerd interface for a scenario titled "Standard 15/08/2025". At the top right, there are buttons for "Create scenario", "Create report", and a menu icon. Below this, it says "Single scenarios" and "3 Scenarios". A table lists three scenarios:

Title	Description	Date created	Status
Exercise 1	50% less lameness	15/08/2025	Completed
Exercise 2	Heat observation rate +20	15/08/2025	Completed
Exercise 3	Sexed semen heifers	15/08/2025	Completed

A dropdown menu is open for Exercise 3, showing options: "View results", "Edit", "Duplicate", "Download", and "Delete scenario". Below the table, there are two large blue buttons: "Check prices" and "Run scenario".

Exercise 3: What if we inseminate all the heifers with sexed semen?

Answer the following questions:

- What happens with the replacement rate (table [Herd dynamics](#)) and why?
The replacement rate increases by 2,6, because now there are more heifers available to replace low yielding cows
- How does the replacement rate affect the number of productive years per cow (tables [Herd dynamics](#) and [Animals in different categories](#)) and why?
It decreases by 0.2 years per cow. With a larger rate of young cows entering the herd, the average age naturally decreases.

- c) How does the methane emissions change (tables *Milk yield, feeding and methane production* and *Animals in different categories*) and why?

The methane increases with 0.68 gram per kg ECM. Sexed semen increases the number of animals in the herd: more heifers in the stable equals more methane emitted from the herd.

Exercise 4: What if the milk yield increases?

Answer the following questions:

- a) **Before you check the results!** How much do you think the milk yield increases per cow-year, when the peak yield is increased by 1 kg? Check the results – how much does the milk yield actually increase?

+289 kg

- b) How much does the gross margin increase?

+€24,199 per year and +€121 per cow-year

- c) Is a 1 kg increase still beneficial when it requires a higher feed cost?

No, now there is a loss of €4,422 per year and €22 per cow-year