

Costs and key points of managing cows on pasture through intensive controlled grazing

Managing cows in pasture through controlled intensive grazing has two types of costs because the costs of setting up the pasture are considered external to the system: (1) **costs of installing the infrastructure**, which include installing the electric fences, the system to bring water to the plots, and the barn; and (2) **the daily running costs of the herd**, which include workers' time to move and feed animals, time to clear the field after the cows pass (only in spring), forage price and milking time, if they are dairy cows.

■ Quantification of the costs of managing cows on pasture using intensive controlled grazing

The quantification of what it means to manage cows on pasture is based on three different types of costs:

1. **Cost of setting up the pasture.**
2. **Cost of installing the infrastructure.**
3. **Daily running costs for the herd.**

Next, we will describe the different alternatives that we have analysed for each of these processes, indicating the costs they represent and their variability (Table 1). The cost of the cows, which can range between **€1200 and €2500 per cow** (for the Simmental breed, which is the one we have used in the Polyfarming system), is not included and this is a mandatory initial cost if we start from 0.

1. Cost of setting-up the pasture. This cost includes defining the pasture area needed to manage the cow herd. The cost of producing the pasture depends on its area, the initial conditions and the possibility of mechanisation to perform direct sowing. Two situations arise:

- **If the cows will be used in an area where there is already pasture, the cost can be considered 0**, since moving the cows itself allows the pasture to be maintained at no additional cost.

- **If there is no pasture in the area chosen for exploitation, costs arise from setting it up.** These costs can be found in the sheet corresponding to the development of a pasture.

2. Cost of installing the infrastructure. This cost includes the exterior fencing of the entire pasture area and the electric fences to separate the plots. The costs of such infrastructure are the following:

- **The cost of placing the electric fence for the plots includes the material and staff.** The materials are: **metal bars (€1/bar)** every 6 m, **2 insulators (approximate price €32/100 units)** and **two electric wire lines (€15/200 m)**. These costs are about €31/100 m of fence (€16 for bars + €10 for insulation + €15 for wire). The **time for two workers to lay 100 m** would be **0.75 h**. For the system to work properly, it is necessary to consider in each case how many plots are needed to feed the cows throughout the year. This depends on the number of cows, the productivity of the pasture and the seasonality of the area.

- **The cost of installing the system to bring water** to all the plots depends on the design of the pasture. It includes the **hose system** (about 150 m of pipe per ha-price around **€0.5/m and five taps** to connect the hoses to the drinkers **€12/tap**) and the drinkers, which for less than 30 cows can be made with plastic drums at a very low cost (no more than €20 per drinker).

- A set of **permanent infrastructure is required, such as a stable** (which costs around **€6000** when there are no more than 20 cows), which is necessary both for health reasons, in case it is necessary to separate animals with a specific treatment, and for milking the cows when they are for milk.

3. Daily running costs for the herd. The daily running of the cow herd includes the following aspects.

- **Moving the animals** includes moving cows from one plot to the next. This represents a total of **0.5 h per day for a worker on the farm** every day of the year.

- The **clearing of the non-consumable vegetation** of each plot (mainly in spring) represents an average dedication of **1 hour per day of a worker in plots of 1000 m²**.

- The **pasture represents between 30% and 100% of the cows' diet** depending on the months, as indicated in the sheet for herd management on a pasture. The rest must be provided in the form of forage. Calculating an average of **27% forage each month**, each cow should receive an average of **5 kg of forage per day**, although distributed in different ways throughout the year. The price of forage can vary, but **small bales (20-30 kg)** cost around **€7/bale**, and **large bales (300-400 kg)** around **€60/bale**. When the forage comes from farm surpluses in times of high pasture production, there is no cost.

- To this must be added the **time spent by a worker feeding the cows: about 0.5 h per day**. When this contribution must be made, the forage must be loaded onto the trailer, taken to the field and distributed.

- **If the cows are dairy cows**, they are taken to the barn every day to be milked. **The milking time per cow is 5-10 min** (includes cleaning the teats, milking and sealing the teats). The total herd time is highly variable because it depends on the number of cows milked at the same time.

- **Other occasional costs are: inseminating the cows** (once a year) and **carrying out a sanitary control** (also once a year). These are basically veterinary costs, but also for the workers accompanying the veterinary and facilitating their work.

From these considerations, we can establish a series of simple calculations to estimate the **overall costs of managing cows on pasture through intensive controlled grazing**. These calculations are based on a herd of 10 cows. The total cost is the sum of two costs, since the third, that of setting up the pasture, is considered in the corresponding sheet:

$$C_{\text{total}} = C_{\text{infrastructure}} + C_{\text{functioning}}$$

Installation of infrastructure (per 1000 m² plot), the sum of three costs:

$$C_{\text{electric fences}} = 120 \text{ m} \times 31 \text{ €/100m (electric fence per plot approximately 30x30 m -1000 m}^2\text{-, includes poles and wires)} \\ + 120 \text{ m} \times (0.75 \text{ h} \times 2 \text{ workers}) / (100 \text{ m}) \times \text{Salary/h (work to assemble the wire around the 1000 m}^2\text{ plot).}$$

$$C_{\text{irrigation system}} = 15 \text{ m} \times \text{€} 0.5/\text{m (pipe)} + \text{€} 12 \text{ (tap)} + 20 \text{ € (trough)}$$

$$C_{\text{stable}} = 6000 \text{ € (complete stable, it is used for all plots)}$$

Daily operation, the sum of four costs:

$$C_{\text{movement}} = 0.5 \text{ h/day} \times \text{Salary/h}$$

$$C_{\text{clearing}} = 11 \text{ h/day} \times \text{Salary/h (only in spring)}$$

$$C_{\text{feed}} = 5 \text{ kg forage/day and cow} \times \text{€} 0.3/\text{kg} \times 10 \text{ cows (external forage)} + 0.5 \text{ h/day} \times \text{Salary/h (placement of forage on the plot) (only at certain times of the year)}$$

$$C_{\text{milking}} = 0.12 \text{ h/day and cow} \times \text{Salary/h}$$

■ Considerations on the optimal strategy for managing a herd of cows through intensive controlled grazing

The **key points** that we must consider in the management of cows on pasture are the following:

- **The preparation of the land for the pasture is not included**, the pasture should be available from the start.

- There are **very important differences in some of these calculations depending on the breed of the cows**, and if they are intended for milk or meat.

- **A key point is deciding how the calves are managed**. They normally work as a second herd, which has less demands than cows, especially if they are dairy cows. They can go behind them in the pasture plots.

- **Water is a very limiting factor**, since it **determines the growth of the pasture** and the amount of forage that must be obtained to supplement diet.

Parameter	Unit	Value used	Variability and causes
Cost of cows	€/cow	2000	There is a lot of variety, it depends on the breeds and their use.
Pasture area per cow	m ² /cow and day	75	50 in spring when there is a lot of grass, 100 in other seasons, some months the feed should even be supplemented.
Number of plots for the system to function all year round	plot	60	The best would be to have as many plots as days that have the longest optimal resting point in a year, it ranges between 60-80.
Cost of the fencing material of the plot	€/100m	31	It includes iron bars, insulators and wires. The fences that are next to roads have a higher cost because they are reinforced
Time to fence the plots	h/100 m and 2 workers	0.5	-
Stable cost	€	6000	This would be for 20 cows, it can vary greatly depending on use and size.
Drinker cost	€/drinker	20	It may vary according to the models. When there are many cows, large and expensive infrastructure are required
Installation of water	€/plot of 1000 m ²	40	It depends on where the water is to be drawn from. It includes the assembly, which is simple, of pipes, taps and drinkers.
Time to move the cows from one plot to another	h	0.5	It varies according to the distance between plots, and how long the cows take to respond
Time to clear non-consumable vegetation	h/1000 m ²	1	Mainly in spring. It depends on how much vegetation is left, so it can vary (0.5-1.5 h)
Amount of forage to feed the cows	kg/(day and cow)	5	It is a totally variable value between months, some should receive 15 and others do not need anything.
Forage price	€/bale	€7/small bale, €60/large bale	It is highly variable, the price per kg is higher for small bales (20-30 kg) than for large bales (300-400 kg)
Time to feed the cows	h	0.5	As has been said, in each month the amount is different and so too is the time therefore
Time to milk the cows	h/cow	0.12	The total time for the entire herd is variable because it depends on the cows that can be milked at the same time

Table 1. Parameters used in the calculation of the costs of the production of cows in pasture, indicating the values used in Polyfarming and the possible variability that can occur in these values.