Sheepfold Innovation System
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STRUCTONICA SRL

Note:

Project: PDF - Project Development Fund - creation of distribution-hub and processing area for micro-scale producers – Romania
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Summary

The first phase of „PDF - Project Development Fund - creation of distribution-hub and processing area for micro-scale producers - Romania - 15.07.2103” project report, revealed a number of limitations and needs for the members of a sheepfold. We need to mention a few conclusions as fundamental base of the present summary:

- The sheepfolds that are the objects of the study case are situated around Viscri, Bunesti commune, Brasov county

- The 3 sheepfolds count a similar number of sheep, around 1500-2000 heads;

- The most encountered problems: low number of personnel in report with the number of sheep, reduced hot water supply, long distances to the water supply (in some cases), difficulty in mounting and dismounting of the sheepfold construction and lack of minimum electrical supply.

- **Key words:** sheepfold, sheep, panels, fancing, emplacement “târlă”

The three visited sheepfolds count a similar number of sheep. The personnel who ensure the smooth running of the daily activities count around 6-8 persons.

The number of people attending the sheepfold is decisive when it comes to moving the emplacement and the paddock of the sheepfold, the most important operations in a sheepfold:

- Borcoman’s sheepfold – the moving of the emplacement and of the paddock takes around 2 hours and 5 people are needed

- Stelian Marcu’s sheepfold - the moving of the emplacement and of the paddock takes around 3-4 hours and 3 people are needed

- Damian Ioan’s sheepfold - the moving of the emplacement and of the paddock takes around 2 - 3 hours and 4 people are needed
The emplacement is usually moved linear to the left or to the right as you can see in the attached plan. During the 10 – 20 days of stationary, the emplacement occupies approximate 0.7 - 1.0 ha area needed for pasture, this area being similar for all the above three sheepfolds.

Another very important aspect is the presence of water supplies in the area needed for both the sheep and milk processing. The number of springs varies in this area; some of the sheepfolds have to cover long distances to get water for the sheep and to cover their water needs.

The opportunity of the report

The main problem is considered to be the repositioning of the emplacement at large intervals (2 – 3 weeks, even 30 days during the summer) for the pasture. This leads to a significant deterioration of the soil, where the sheep are kept for longer time.

Based on the evaluation of the challenges and considering the discussions with the three shepherds, a series of measures were proposed, aiming to improve the sheepfolds conditions. In order to encourage the every 3 days movements of the emplacement, different solutions for joining the panels leash have been presented taking into account the costs involved, the weight and easy handling of the sheepfold structure.

The lengths of the panels are between 2m and 4m, this having both advantages and disadvantages. These aspects will be taken into consideration in choosing the right solution for the construction depending on the sheepfold emplacement and the possibilities to produce these elements.

Generalities – traditional sheepfold

The Romanian sheepfold includes a room in which the milk is boiled and the shepherds’ food is being prepared. This room is called “heaters” room (fierbatoare). The cheese is kept for maturation in a place called “cașerie” or “celar”. The sheep are milked in a place called “strungă”, which has two annexes: big detour and small detour (or cotar). The space between the heaters room and the “cașerie” is called “comarnic” or porch. Close to this place, the shepherds’ bedroom can be settled. The “strungă” placed between the two detours țarcuri are small gates that allow the sheep to be milked.
For the traditional sheepfold (the circular shaped one), the movement involves translation and relocation of a large number of fencing panels. The covered space is compact. In case the sheepfold is rectangular, its movement involves a lower number of fencing panels, as one side is common and stays in the same place for two consecutive relocations. The pasture area is more compact in this case.

Figure 1. Traditional sheepfold: a) structure, b) fencing, sheep circuits

Figure 2. Sheepfold displacement: a) traditional shape, b), c) rectangular shapes relocated towards the shorter side or the longer side
Architectural panels of fencing of the sheepfolds

**Type P1**

- wooden pillars fixed to the ground;
- pillars in the panel enclosure;
- horizontal wooden elements;
- panel enclosure bracing - against the wind;
- panel length – 4 m;
- approximate weight - 35 kg;
- cost/panel – approx. 90 Ron including workmanship for constructing fencing panel sheepfold.

**Type P2**

- wooden pillars fixed to the ground;
- horizontal wooden elements, fixed pillars with rope or nails;
- no initial workmanship. Nevertheless the relocation of the sheepfold, time and workmanship will be significant because dissolution and panel mounting piece by piece;
- panel length – 2-3 m;
- approximate weigh - 22 kg;
- cost/ panel - approximate 45 Ron.
Type P3

- wooden pillars fixed to the ground;
- horizontal elements – PVC cables;
- fasteners plastic cables pillars;
- initial workmanship includes catching the fasteners cable wooden pillars; the time and workmanship increase significantly;
- panel length – 2 m;
- approximate weight 10 kg;
- cost/panel – approximate 60 Ron.

Type P4

- wooden pillars fixed to the ground;
- horizontal and vertical pillars used in the fencing;
- interlaced planks;
- the advantage of the panel is represented by its sturdiness;
- length of the panel – 4 m;
- approximate weight 40 kg;
- cost/panel - approximate 110 Ron.
Type P5

- pillars with circular section profiled steel and primed;
- galvanized wire mesh;
- plastic or metallic fixing accessories for the wire mesh on the pillars;
- low cost workmanship, but high acquisition cost for the materials;
- panel length – 2 m;
- approximate weight - 8 kg;
- cost/panel - approximate 100 Ron.

Type P6

- pillars with circular section profiled steel and primed;
- plastic mesh (PE – polyethylene);
- fixing accessories for the mesh to the pillars;
- low cost initial workmanship – catching the fasteners of metal pillars; the time and the workmanship during the sheepfold relocation increase but they compensate with the reduced weight of the materials;
- panel length - 2 m;
- approximate weight - 4.50 kg;
- cost/panel - approximate 65 Ron.
**Type P7**

- fiber pillars fixed to the ground;
- horizontal elements – plastic or textile cables;
- fixing accessories for the pillars;
- panel length – 2 m;
- approximate weight 4 kg;
- cost/panel - approximate 115 Ron.

**Figure 9. Fiber pillars with cables and accessories**

**Type P8**

- metallic pillars fixed to the ground or counterweights;
- metallic mesh;
- the fixing of the mesh is done in the profile of the pillars using metallic accessories;
- low cost initial workmanship; further, the time and the workmanship are quite low cost, as it is relatively simple to fix the mesh on the pillars and the weight is quite reduced.
- panel length - 2 m;
- approximate weight - 6,50 kg;
- cost/panel - approximate 70 Ron.

**Figure 10. Metal fencing pane**
Type P9

![Galvanized metallic panel](image)

Figure 11. Galvanized metallic panel

- galvanized metallic pillars fixed to the ground or on the ground with the use of counterweights,
- horizontal galvanized metallic elements;
- galvanized mesh;
- low cost workmanship for producing the panel, but the materials purchase cost is quite high;
- the main advantages is represented by the stability and duration of the panels;
- panel length - 2 m;
- approximate weight - 18 kg;
- cost/panel - approximate 180 Ron.

Type P10

![Metal pillars and galvanized welded mesh](image)

Figure 12. Metal pillars and galvanized welded mesh

- metallic pillars fixed to the ground;
- galvanized metallic mesh;
- fixing elements - plastic ties;
- low cost workmanship for producing the panels;
- panel length - 2 m;
- approximate weight - 10,50 kg;
- cost/panel - approximate 80 Ron.
Type P11

- fiber pillars fixed to the ground;
- textile mesh panels;
- fixing accessories;
- low cost initial workmanship – cutting the textile mesh and fixing it to the pillars;
- panel length - 2 m;
- approximate weight - 1 kg;
- cost/panel - approximate 70 Ron.

Type P12

- wooden pillars fixed to the ground;
- galvanized metallic mesh;
- tension steel wire;
- the main advantages - reduced acquisition costs and low cost initial workmanship: mesh debit size and fixing the accessories for the tension steel wire on the wooden pillars;
- the main disadvantage - the complexity of dismounting and mounting of the metallic wires
- panel length - 2 m;
- approximate weight - 8.50 kg;
- cost/panel - approximate 50 Ron.
Type P13

![Image of wooden pillars and textile or plastic semi-opaque mesh]

**Figure 15. Wooden pillars and textile or plastic semi-opaque mesh**

- Wooden pillars fixed on the ground or with counterweights;
- diagonal stabilizing pillars fixed in the ground or counterweights;
- textile or plastic semi-opaque mesh (PE – polyethylene);
- low cost initial workmanship, reduced weight of the materials ease the relocation of the sheepfold and saves time. The main disadvantages – stability and durability of the structure;
- panel length - 2 m;
- approximate weight - 6 kg;
- cost/panel - approximate 55 Ron.

Type P14

![Image of wattle panel]

**Figure 16. Wattle panel**

- wooden pillars fixed to the ground;
- wattle panels;
- rope or wire panels fastened to the pillars;
- the main advantage – natural materials and considerable durability. The main disadvantage – high cost initial workmanship implying high total cost
- panel length - 2 m;
- approximate weight - 16 kg;
- cost/panel – approximate 120 Ron;
Tip P15

Figure 17. Galvanized metallic panel with feet

- galvanized metallic panel with feet and counterweights;
- no initial cost for workmanship, but a very high acquisition cost of the materials;
- the main advantages: the robustness of the panels, the method of fastening (one to the other), and durability (coming from the galvanized metallic elements);
- panel length - 3 m;
- approximate weight - 26 kg;
- cost/panel – approximate 225 Ron.

Fixing details of the fencing panels

Figure 18. Details: a) accessory cable fixing to the wooden or metallic pillars, b) fixing accessory of the mesh to the metallic pillars, c) tension wire on wooden or metallic pillars, d) rope for wooden pillar fastening
Synthesis of the types of fencing sheepfold

In the following table there is a summary of the 15 types of fencing sheepfold studied, in order to evaluate the structure, location and relocation of a sheepfold. The main criteria for the presentation are: types of the materials, length and weight of the fencing panels and their costs.

**Table 1**

*Synthesis – fencing panels sheepfold characteristics*

<table>
<thead>
<tr>
<th>No</th>
<th>Panel type</th>
<th>Description</th>
<th>Length [m]</th>
<th>Weight [kg]</th>
<th>Cost/panel [Ron]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>P1</td>
<td>Traditional wooden panel</td>
<td>4</td>
<td>35</td>
<td>90</td>
</tr>
<tr>
<td>2</td>
<td>P2</td>
<td>Traditional Wooden Panel (only uprights and horizontal panels)</td>
<td>2-3</td>
<td>22</td>
<td>45-60</td>
</tr>
<tr>
<td>3</td>
<td>P3</td>
<td>Wooden pillars and PVC cables</td>
<td>2</td>
<td>10</td>
<td>60</td>
</tr>
<tr>
<td>4</td>
<td>P4</td>
<td>Wooden pillars and wooden board panels</td>
<td>4</td>
<td>40</td>
<td>110</td>
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<tr>
<td>5</td>
<td>P5</td>
<td>Galvanized metallic panel and metallic pillars</td>
<td>2</td>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td>P6</td>
<td>Metallic pillars and plastic mesh (PE – polyethylene)</td>
<td>2</td>
<td>4,50</td>
<td>65</td>
</tr>
<tr>
<td>7</td>
<td>P7</td>
<td>Fiber pillars with cables and accessories</td>
<td>2</td>
<td>4</td>
<td>115</td>
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<tr>
<td>8</td>
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<td>Metal fencing pane</td>
<td>2</td>
<td>6,50</td>
<td>70</td>
</tr>
<tr>
<td>9</td>
<td>P9</td>
<td>Galvanized metallic panel</td>
<td>2</td>
<td>18</td>
<td>180</td>
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<td>10</td>
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<td>Metal pillars and galvanized welded mesh</td>
<td>2</td>
<td>10,50</td>
<td>80</td>
</tr>
<tr>
<td>11</td>
<td>P11</td>
<td>Wooden pillars and textile or plastic semi-opaque mesh</td>
<td>2</td>
<td>1</td>
<td>70</td>
</tr>
<tr>
<td>12</td>
<td>P12</td>
<td>Wooden pillars and galvanized metallic mesh</td>
<td>2</td>
<td>8,50</td>
<td>50</td>
</tr>
<tr>
<td>13</td>
<td>P13</td>
<td>Wooden pillars and textile or plastic semi-opaque mesh</td>
<td>2</td>
<td>6</td>
<td>55</td>
</tr>
<tr>
<td>14</td>
<td>P14</td>
<td>Wattle panel</td>
<td>2</td>
<td>16</td>
<td>120</td>
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<tr>
<td>15</td>
<td>P15</td>
<td>Galvanized metallic panel with feet</td>
<td>3</td>
<td>26</td>
<td>225</td>
</tr>
</tbody>
</table>
In order to exemplify the cost of the sheepfold fencing panels, a 0.5 m²/1 (one) sheep was taken into account. For 1,000 sheep, the needed surface of the sheepfold emplacement is 500 m². This surface can be arranged 20 m x 25 m – usual real dimensions. The resulting perimeter is 90 m.

The number of panels required depending on the length thereof is as follows:
- for the panel length of 2 m – 45 panels;
- for the panel length of 3 m – 30 panels;
- for the panel length of 4 m – 23 panels.

The cost of fencing for 1,000 sheep a land parcel with an area of approximately 500 m² and a perimeter of 90 m is expressed in relation to the length of panel used:
- panel length of 2 m – 45 panels:
  - minimum cost - 2.250 Ron;
  - maximum cost - 8.100 Ron;
  - medium cost - 3.788 Ron;
- panel length of 3 m – 30 panels:
  - minimum cost - 1.800 Ron;
  - maximum cost - 6.750 Ron;
  - medium cost - 4.275 Ron;
- panel length of 4 m – 23 panels:
  - minimum cost - 2.070 Ron;
  - maximum cost - 2.530 Ron;
  - medium cost - 2.300 Ron.

As mentioned above, the minimum cost for fencing a 1,000 heads sheepfold is 1,800 RON, the fencing being done using wooden elements, with panel length of 3m (type P2). Among the cheapest sheepfold fencing solutions, the cost per sheep being between 1,80 RON 2,10 RON.

These elements are not made in a panel itself, time and labour to move the sheepfold, added to the cost of fencing is very likely to exceed a more expensive (as initial cost)
solution in which the panels are already made. This difference is 270 Ron between the 3m panels, the 4 m panels and the 2 m panels. The conclusion is obvious: there are two important compounds that define the cost of sheepfold fencing:

- the initial cost: materials purchase, panels features;
- the operating cost: quantified at every sheepfold relocation.

Conclusions

The findings of this report are presented in a table that will analyze the most important issues that the fencing panels to a sheepfold differ. They are robustness, durability and cost (initial cost and operating cost).

Table 2

Rating fencing panels sheepfold

<table>
<thead>
<tr>
<th>No.</th>
<th>Panel Type</th>
<th>Robustness</th>
<th>Durability</th>
<th>Cost/panel [Ron]</th>
<th>Cost/relocation 1,000 head sheepfold [Ron]</th>
<th>Total points</th>
</tr>
</thead>
<tbody>
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<td>P1</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>3</td>
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<td>5</td>
<td>1</td>
<td>4</td>
<td>15</td>
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</tbody>
</table>
It was considered a score of 1 - 5 for each of the studied feature is defined as follows:

- 1 for the lowest robustness and durability;
- 5 for the highest robustness and durability;
- 1 for the highest cost/panel and the cost for relocation;
- 5 for the lowest cost/panel and the cost for relocation.

It is worth mentioning that the price resulting from operations was evaluated based on the weight of fencing panels, time and labor required for the sheepfold relocation. The lighter panels, which require little time to unpack and mount accumulated 5 points and the items that are not made in panels and require actual relocation piece by piece or have a significant weight got 1 point.

We need to mention that it is difficult to pinpoint an optimal solution for fencing a sheepfold. Different constructive solutions differ in the 3 parameters identified and each solution presents both advantages and disadvantages given the robustness, durability and cost. The time and the type of materials used for a sheepfold fencing depend mainly on the existing materials in the area, the possibilities and the costs of purchasing materials, the availability of existing staff in some sheepfolds and, not the least, the capabilities and means of transport.
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