

GRASS HARVESTING SYSTEMS IN WALLOON

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INTRODUCTION

Walloon is made up of several areas being characterized by rather typical farms. We distinguish four great areas:

- an intensive dairy breeding located in the North East of Walloon,
- an extensive breeding orientated towards the meat production and located in the south of the country,
- a big crop in the centre,
- a mixed one: crop – breeding, around the previous one.

Figure 1 shows for each area, the proportion of farms with bovines and the proportion with milk cows. Thus in the dairy cattle-breeding area, 90% of the farms have bovines and 60% are of dairy type. In the south area, the percentage of farms with bovines is also high but only 30% of them have dairy cattle. In the mixed part and crop, the proportion of farms with bovines is respectively 80, and 70% are those with a dairy livestock of 40 and 35%.

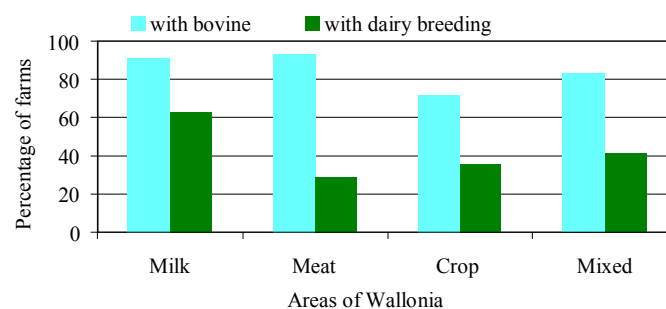


Fig. 1. Proportion of farm with bovines and dairy herd

In each of these areas, harvesting systems improved in a different way. Those are influenced by many factors such as:

- the size of the farms and needs for the animals (milk or meat production),
- the material and the available labour,
- the other fodder crops of the farm (corn, straw...),
- the practices and knowledge of stockbreeders,
- the technical evolution of the materials...

The following paragraphs show the evolution of usual grass harvesting systems in these various areas. Even though the farms are not identical inside a given territory, there are many similarities.

THE INTENSIVE DAIRY CATTLE-BREEDING AREA

Farms are often only focused on dairy production, with 40 to 50 cows having an average production between 6.500 and 7.000 litres per cow.

The main fodder is grass silage with corn for some of them. The owners try first to get a quality food and harvest 4 to 5 cuts of a 2 to 3 tons of dry matter production per hectare.

The most widespread harvesting technique is the grass silage using a trailed forage wagon. About 25 years ago, part of the owners had their own harvesting equipment, but gradually agricultural contractors dealt with all silage works. The most common system is made up of 2 to 3 forage wagons completed with an equipment for compressing.

For the distribution, owners generally used simple block cutter. Currently, due to the increase of the size of livestock, silage feeder but also of the mixing trailers are more and more used.

These last years, the proportion of the harvesting conditioned in wrapped bales, initially cylindrical then cubic, keeps on growing, and this in spite of the higher cost of its techniques.

Another recent evolution is the come back of self propelled forage harvester for grass harvesting essentially where there is some corn. The use of these very powerful machines can be explained by:

- the increasing size of farms having bigger fields,
- the use of big working width windrower,
- the use of mixing trailer requiring a correctly chopped fodder in particular for the work of the cutter.

Lastly, contractors proposed for some years works of haymaking, mows and windrowing mainly, at very attractive prices.

THE SOUTH AREA WITH MEAT PRODUCTION

In this area, cereals, beets, corn... are very rare. Meadow represents the biggest part of the agricultural area. We also noticed that there are not many agri-

cultural contractors. Works mainly concern fodder harvesting and the spreading of organic matter.

About 25 years ago, grass was mainly harvested as hay. Because of climatic risks, harvests were often late and of a poor quality. This was not a problem for nursing cows for which food requirements are not very high.

Thereafter, with the use of round balers, the situation did not change a lot. Except that this type of press became famous and strongly increased with the development of the technique of wrapping. This system gradually became necessary; and the equipment implied are the property of the owners or farmers associations. With the increase of available powers, cubic baling presses are more and more used.

THE MIXED AREA

There are in this part of Walloon, farms associating crop and meat and/or dairy breeding. According to the importance of the breeding in the farm, forage production will be more or less intensive.

Considering farming operations, these farms are generally rather well equipped. In most of the cases, corn feeding prevails.

The agricultural contractors are well developed and take care of fodder harvesting. This area includes every possible harvest techniques in variable proportions. Currently, the main harvesting systems are:

- silage with the self propelled forage harvester (because of corn),
- pressing of cubic bales of hay or of silage (because of straw).

We notice a decrease of the use of cylindrical baling presses in aid of the use of machines making cubic bales and offering higher performances as well as a greater facility of distribution for silage fodder. Lastly, trailed forage wagon never had a great importance.

THE CROP PART

In this part of Walloon, the ground is of very good quality and crop strongly developed. We mainly find sugar beets, cereals, potatoes, colza and oilseeds. These last years, many owners developed an activity aiming at fattening bovines. But for those, very little fodder is produced in the farm. The feed of these animals generally consists of mixed straw concentrates.

There are also mixed farms which look like the farms of the preceding area. Harvesting equipment used are thus mainly the self propelled forage harvester and the cubic baling press.

OBSERVATION OF THE SITUATION

A survey was carried out among 66 farms and of 15 agricultural contractors. The study aimed to analyse, for each area, the organization of the various harvest systems, to observe the advantages and disadvantages and to determine their performances and cost. Work was divided into different steps:

- selection of farms and agricultural contractors,
- collection of information specific to the different farms: crop, surface, cattle, infrastructures, available staff, characteristics of the equipment, etc,
- follow-up of all the activities when harvesting (working time, equipment used, supplies and activities of the contractor),
- estimation of the fodder storage obtained by the different harvests starting from measurements and weighing,
- data processing in order to obtain the necessary working time, the cost of harvests...

Although the results are only valid for the conditions under which they were obtained, the study makes it nevertheless possible to obtain very general rules.

PERFORMANCES OF HARVESTING SYSTEMS

For all harvests, we took down for each operation, the surface treated and the hours of work in order to be able to determine the performances of the harvest equipments. The main factors influencing the performances of the machines are:

- the production varying from less than one ton of dry matter to more than 6 tons of dry matter per hectare;
- the distance of the fields, determining factor especially when using trailed forage wagon.

The working time for the different techniques (Figure 2) is expressed on one hand in hour per hectare (from 3,5 to 13,26 h/ha) and on the other hand in hour per ton of dry matter (from 1,5 to 4 h/tDM). This second way of expressing the results makes it possible to reduce the variations due to the differences of fodder production between harvesting methods. The variations between the different techniques are modified. Thus, cubic bales of hay require an important working time per hectare because of a rather important average production, but a poor working time per ton of dry matter.

Under the conditions of the survey, the trailed forage wagon is the least demanding technique in labour. The self propelled forage harvester requires a little more labour and although it offers raised performances, these last ones are however often limited by the transporting or compressing possibilities (2,5 ha/h on average).

The high capacity of cubic baling presses when harvesting hay and the facility of handling of high density bales make this technique very powerful. On the other hand, silage bales require a more important working time.

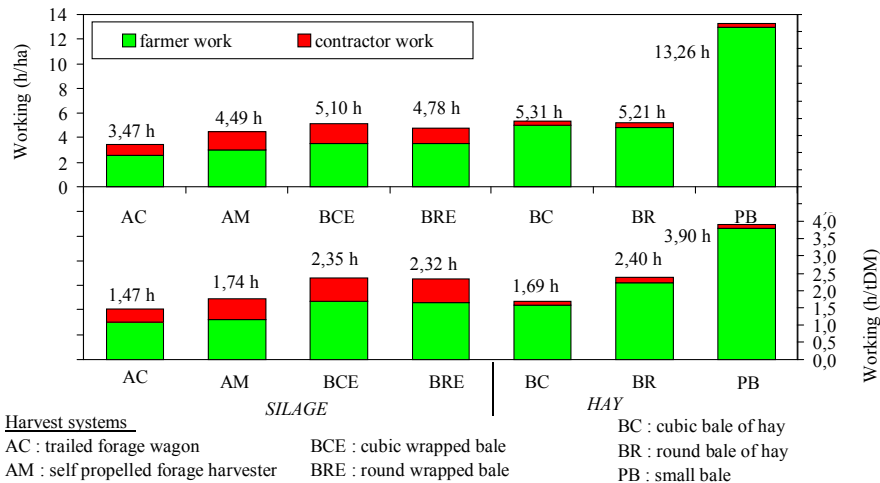


Fig. 2. Necessary working time for the different techniques

The working time necessary to carry out small bales of hay is very high: 12 to 14 hours per hectare or 4 hours per ton of dry matter. This explains the progressive disappearance of this system to the profit of the carrying out of big bales.

With the increase of grass production, the working time per hectare is obviously increased. On the other hand, the working time per unit of harvested dry matter decreases. We noticed a time saving of about 0,35 to 0,55 hour per ton of dry matter while the fodder production increased by a ton of dry matter per hectare.

The annual total working time necessary for fodder harvesting depends on the total surface of the cuts. For farms mowing 40 and 80 ha annually, this represents respectively 160 and 280 working hours distributed between the staff of the farm and the contractor. In this case, the annual working time increases by 75%. This slower increase is due to having by the implementation of more powerful materials and techniques in farms having large surfaces to harvest. The participation of the contractor is practically constant, about 1 working hour per hectare.

THE COST OF THE HARVEST SYSTEMS

The mechanization cost for the farms concerned with the survey was calculated on the basis of the utilization cost of machines and of the money paid to the contractors, and then reported to the unit of area and to the unit of dry matter mass.

Although during the survey, only harvesting works were considered, the cost price of harvests takes into account an evaluation of the storage costs and of the winter distribution (Fig. 3). This procedure allows a more valid comparison between the different harvesting systems.

From an economic point of view, the silage with trailed forage wagon or with self propelled forage harvester and the hay in cubic bales are the most advantageous with a cost ranging between 80 and 100 €/tDM. The price of cubic baled silage and small bundles is definitely higher, with an average reaching more than 125 €/tDM. The other harvesting systems have an intermediate cost around 120 €/tDM.

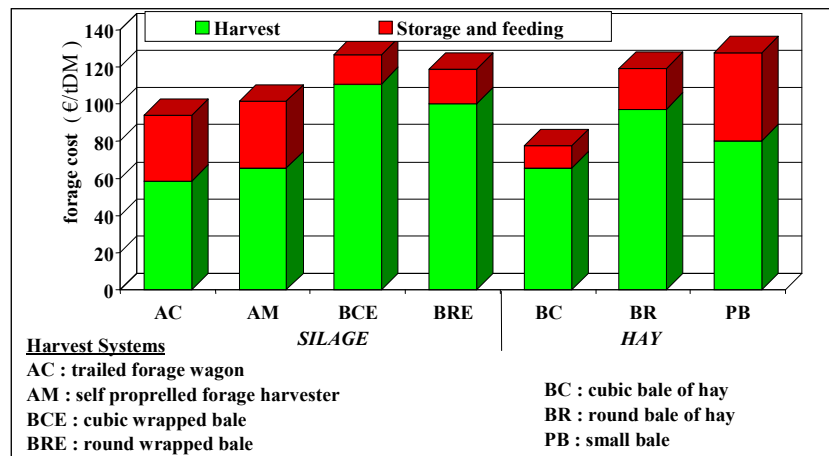


Fig. 3. Synthesis of the harvesting cost + estimate of storage and winter distribution

Generally, owners use several techniques during the season. It is essential that they use an economic system for the most important harvests. Figure 6 shows the distribution of the number of harvest according to their cost (storage and distribution not included). We notice that about half of harvests have a cost ranging between 25 and 75 €/tDM. However some cuts have a cost price largely higher than 125 €/tDM.

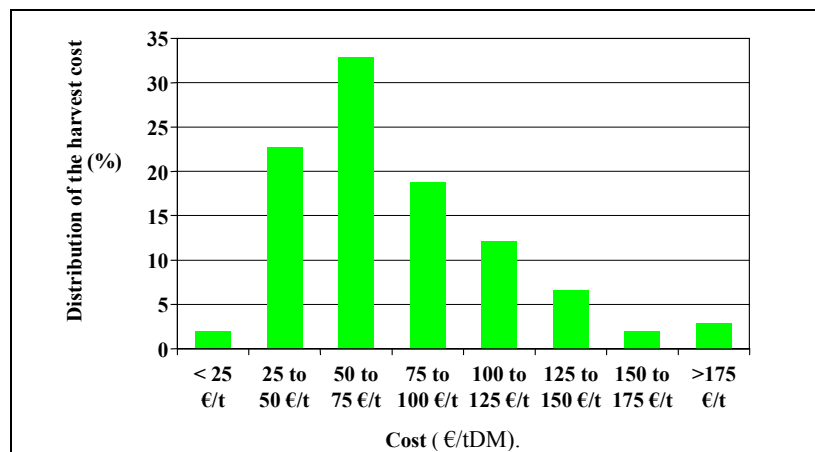


Fig. 4. Distribution of the number of harvests according to their cost price

The analysis on behalf of each operation in the harvesting total cost brings out the possibilities of economy. Figure 5 shows the proportion of the cost of each operation to the harvesting total cost for each system

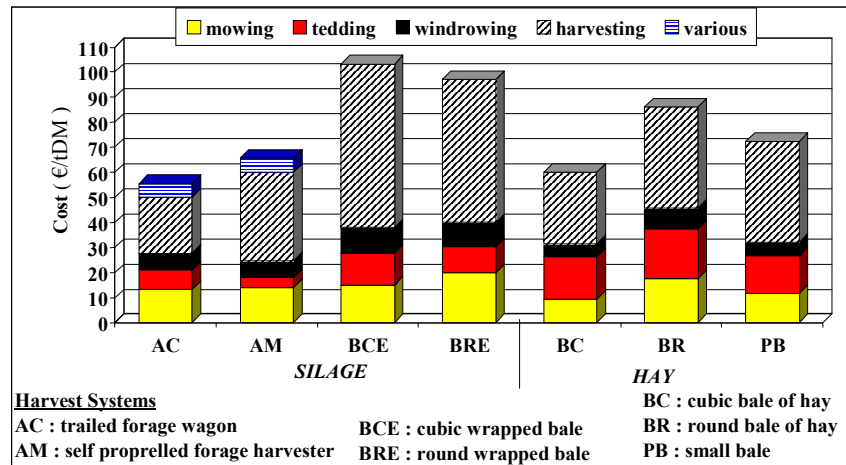


Fig. 5. Distribution of the harvesting cost between the different operations

Mowing, operation generally carried out by the farmer, accounts for 15 to 25% of the total cost. The cost apparently weaker of the mowing for small bales and the big cubic bales of hay is explained by the fact that the fodder production being higher, the price of mowing per unit of dry matter is less important.

For hay harvesting, tedding operations are expensive because there are more passages.

The work of the trailed forage wagon, the self propelled forage harvester and the presses represents about 30% to which it is necessary to add handling operations, transport, wrapping and compressing. The sum of the operations of recovery and installation correspond to 40 to 60% of the harvesting total cost.

Lastly, there remains the preparation and covering of the silos and the possible application of preserving. These operations, under the heading "various", have a sometimes considerable importance (about 10% of the harvesting total cost).

The cost value of fodder includes the cost of the labour which is fixed at 9 €/h for the staff of the farm and 18 €/h for the agricultural contractor. However, depending on the technique, the staff and the performances of the systems are variable. It is interesting to know the cost price of the labour (Figure 6). Only the carrying out of small bales of hay require many people during a relatively long period (loading, unloading and distribution). For this harvesting method, labour represents a cost of about 80 €/tDM of the fodder cost price. However, the loads in equipment remain very limited and lower than all the other techniques. For these last ones, the labour cost varies from 20 to 40 €/tDM, the system of hay cubic bales is less expensive as for the labour and the other methods show few differences.

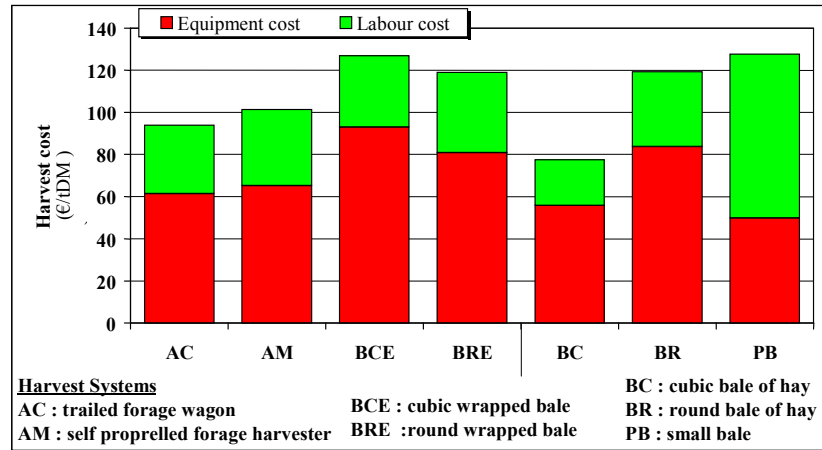


Fig. 6. Importance of the labour in the fodder production cost

As mentioned previously, the owners often turn to the agricultural company for harvesting operations. During the survey, about 95% of the owners turn at least once per season to an agricultural work contractor. The amounts paid to them represent about 35% of the harvesting total cost. Figure 7 shows for the different harvesting techniques the proportion of the cost paid to the company. It can reach nearly 50% of the price of the kilo of dry matter.

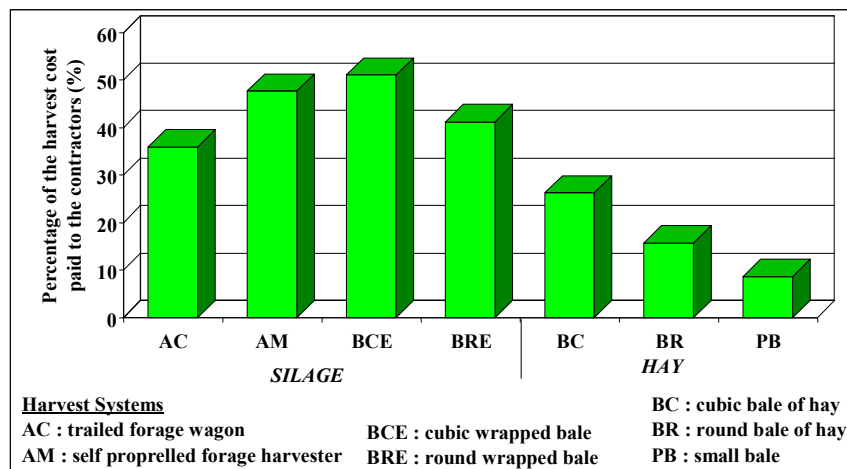


Fig. 7. Proportion of the cost paid to the agricultural contractors

The influence of grass production on the cost of the harvested dry matter mass is particularly important. For example, when using the trailed forage wagon, the cuts having an output lower than 2 tons of dry matter per hectare are characterized by a high cost price, of more than 65 €/tDM. It would therefore be tempting to carry out cuts at an advanced stage of maturity but it should not be forgotten that the quality of grass is then slightly poorer. The ultimate assessment can thus only be established by taking into account the quality parameter of fodder.

CONCLUSIONS

According to the area, harvesting methods have developed differently while meeting the local conditions.

Whatever the area, the choice of an harvesting system strongly influences the price of the fodder produced. It thus follows that silage techniques with trailed forage wagon or with self propelled forage harvester are economically advantageous and adapted to the cuts of great areas. These systems are mainly found in the dairy cattle-breeding area and the mixed zones and of crop, where there is some corn. On the other hand, wrapped bales are more expensive but better adapted to the harvesting of small plots. In the south area, cylindrical bales are often found, farmers being able to purchase this type of equipment individually. Elsewhere, we notice an increase in the number of cubic baling presses in complementation of the other techniques.

For hay, the system of big cubic bales is most powerful and economic. The carrying out of small bales is only possible for limited areas and requires a large staff. However, the investment in equipment remains reduced. Round bales are characterised by an intermediate cost and performances.

The current tendency in grass harvesting favours powerful techniques using less labour. Farmers more and more often turn to a contractor for harvesting operations, the necessary equipment being too expensive. Working in association is still not very widespread in our areas, it would however make it possible in many cases to reduce the financial loads in equipment.

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SUMMARY

The fodder harvesting techniques, necessary working time and the cost depending on the selected fodder harvesting techniques and working conditions in Walloon cattle-breeding areas are presented.