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## THE ROLE OF HORSE LOGGING IN NATURE PROTECTED AREAS OF HUNGARY

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**Abstract:** Nowadays there is a deficiency about horse logging in present literatures and it seems to be like an extinct tradition. The goal of this research is to determine the frequency of horse logging and collect its advantages and disadvantages according to the aspects of forestry and nature conservation. Data was collected on-the-spot, via semi-structured interviews with contractors who deal with horse logging. Altogether 16 contractors have been observed personally, focusing the interviews and on-site studies on how they use animal power in practice. All the 116 state forestries were contacted by phone, preparing a map on the frequency of horse logging in the state forest areas. 30 out of 116 forestries employ contractors who use horses for skidding. This is 25.86 % of all the forestries. 7.76 % of forestries have reported that horse logging is used only occasionally. The main advantage of the method is that it is harmless for the topsoil, the wood stand and saplings. Its environmental significance is that no harmful emission occurs, no harmful fuel presents and the contractors or the locals can produce the forage consumed by the horses as well. The disadvantages are that the output capacity of horse logging is less than that of the machines, there are few people who has knowledge, will and ability to work with horses, moreover working with them requires a traditionally special way of life that is in the brink of extinction in the present times.

**Keywords:** horse logging, skidding, nature-friendly, forestry, tradition

### 1. INTRODUCTION

The skidding is the first phase of the transportation of logs – in a broad sense logging – that goes on from the site of felling to the landing (PANKOTAI – MADAS 1956). Skidding requires high attention to the soil, the wood stand and the saplings. That is why it needs heavy traction force, lower speed and takes so much time (FIRBÁS 1996). Skidding is accomplished through extraction routes that start from the felled wood until the landing along the ground and create access to wood for humans. (PANKOTAI & MADAS 1956). Along these ways the woodland floor could be easily compressed under the weight of the machines (VARGA 2001).

The skidding could happen manually, by draught animals or machines (ANDRÉSINÉ & ANDRÉSI 2008). The last is the most common method for logging, however there are still future possibilities for the draught animals also (FIRBÁS 1996). Horses could double their traction force, moreover they are able to quadruple their power for a moment which is an important factor to make the logs move (PANKOTAI – MADAS 1956). According to WÁGNER (1986) horse logging is able to work in the broadest range, although above the distance with 100 meters horse logging is not profitable compare to the machines.

Before the mechanization of forestry operations, horse logging has been a usual process in forestry but has almost been forgotten in present times. The relapse of the animal power is the consequences of changes in the community and its increasing demands. The important facts become efficiency, time and profit. The only way to fulfil these demands together was the mechanization of forestry. After 1945 the mechanization of forestry developed quickly (KERESZTESI 1971, 1982), although in 1949 the only known and used skidding method was horse logging (HEGYI

1978). At the beginning of the 1950's there were researches to develop the equipment of horse logging by the Forest Research Institute (ERTI). As a result of that a skidder cycle was invented by 1958 (RAJCZI 2010a). This skidder cycle increased the efficiency of horse logging by 27% (KERESZTESI 1964). The mechanization of skidding was ordered to be 50% in 1954 (SZEPESI 1970). By the time of 1979 more than the half (59.7%) of the skidding was made by machines (KERESZTESI 1982). After all, the rapidly developing technology expelled the horses and the forest railways from forestry.

However, increased founding in the aspects of environment and nature protection brings the horse logging in favourable position (RAJCZI 2010b). According to KÁLDY (1968) and WÁGNER (1970) there will be growing demand for the work of horses to secure the saplings. It seems to be horse logging has been living its renaissance these days (VALLÓ 2012, DUDÁS 2013). Although there is only a few literature and research about this skidding method. The aim of this research is to evaluate of the present situation of horse logging in the state owned forests of Hungary.

## 2. MATERIALS AND METHODS

To achieve the goal of the study all of the Hungarian forestries – all together 116 – were surveyed by phone and field observations. The interval of the collection of data was between February and October, 2013. With the result of the phone research the ratio of contractors who apply horses are calculated compare to those who uses machines. The director of Móricz Zsigmond Vocational School was interviewed by phone about their course in horse logging.

Semi-structured interviews were made with those contractors who accomplish skidding with horses in the forests, mainly owned by the state. The semi-structured interviews were constructed according to HÉRA & LIGETI (2010) and this work was the main thread of the survey also. Those areas were selected to visit personally that has high forest cover and with the purpose to collect representative data all across Hungary. Altogether 11 forestries, 16 contractors were observed in the 17 different fields during logging, among them 2 were in privately owned forests and 1 was investigated in 2 different places. The field observations were made to achieve the following goals: to evaluate the viewpoint of decision making on the use of horses, the advantages and disadvantages of horse logging, to collect the experience of the contractors, and to observe the used horse breeds and types. Horse types mean the *cross-breed* which is the result of crossing a warm-blooded and a cold-blooded horse, and another horse type is the *Hungarian muraközi* which is a type of the *Hungarian cold-blooded*. The average useful capacity of a single horse for one round and during one day were observed. In addition, the characteristic of the concerned areas with horse logging and the equipment were also compared.

Besides that, one contractor with an iron horse was also examined during skidding in a privately owned forest. The iron horse is a small tracked tractor equipped with either a manual or power winch and usually used with a timber trailer. During the field observations the investigated facts were documented with photos and videos.

## 3. RESULTS OF THE RESEARCH BY PHONE

During the interval of the research 30 out of 116 forestries employ contractors who use horses for log transportation, these forestries are represented below (*Figure 1.*). This is 25.86% of all the forestries. These forestries regularly apply horses every year. 9 forestries which means 7.76 % of all have reported that horse logging is used only occasionally, approximately twice or three times yearly, which means 100-200 m<sup>3</sup> wood getting logged by horses.

The study measured that 6 forestries require the work of a horse although they have to face some difficulties to implement this goal. First of all, one significant problem is the missing specialists who have deep knowledge of horses. The other is, as the matter of fact there is no stud owned by the Hungarian state selected for forestry works and in other situations there is not enough work for a contractor who is an owner of even a single horse. 3 forestries apply horses for game feeding and hunting with horse carriages but not for skidding. Other 3 forestries have their own horses

and use them for log transportation. 66.38% of all forestries do not apply horses in any way, they substitute their work for mechanized units. Some of them associated the usage of horses with an ancient work method.

The Móricz Zsigmond Vocational School with the co-operation of the University of Kaposvár was launched a course in horse logging to educate professionals. In 2012 there were 28 people altogether attending to the course, however the next year the course was not started again because of the lack of the applicants.

#### 4. RESULTS OF THE FIELD INTERVIEWS

Altogether 16 contractors have been observed personally, examining how they use animal power in practice. The following data were collected during these fieldworks and could be seen in *Table 1*. One of the private contractor was visited in two different areas, because of this his work method (the average capacity of a horse for one round as well as during one day, the used horse breeds, the number of employees and horses) was calculated to the averages only once, except the extinction of the given area.

Horse logging is frequent in the highlands which are not unfolded and have continuous forest cover. Among the visited 17 places there are 15 which are protected natural areas and 3 of them are highly protected natural areas. There are 2 forestries which apply only horses in European Black Pine (*Pinus nigra*) forests because they are harmless for the topsoil, the wood stand and saplings. In those areas which logs are skidded by horses the saplings of native species could grove easily and the regeneration is guaranteed. Instead of the nature-friendly skidding method the situation would be an excessive damage by the machines and the regeneration would be much slower than that. These figures prove the demand of horse logging in those forests where the focus is on the value of the natural habitat, wood and species, furthermore demonstrate the importance of the horse logging in nature conservation and its significance in forestry. These facts also show us the most important advantage of a sustainable log transportation.

The biggest concerned area by horse logging is 23 ha if the given area of the Pécsi Parkerdő is not calculated with its 80 ha. The extension of that area and the purpose of the timber extraction was unusual for horse logging. That forest is a European Black Pine one where 2000 m<sup>3</sup> timber had to be extracted because of an intensively spreading fungus. The smallest area is 0.5 ha. The average extension of the concerned area by horse logging is 6.05 ha if the area of the Pécsi Parkerdő is not added to the average. The most common occasion when horses are used is during thinning that happened with 7 times. The thinning is the term in forestry when some trees usually among young (between 10 and 50 years old) stands has already been selected to remove. This result is proven by ANDRÉSINÉ és ANDRÉSI (2008) too. The reason for this is that those logs weight less and the stands are too dense at these stages to be logged by machines. In these stands, horses could work efficiently with low impact and manoeuver easily as least damage as possible.

The most commonly used horse type is the cross-breed with a rate of 37%. Those contractors who apply cross-breeds prefer their usage because of their fast pace and smaller size. Others swear on the cold-blooded (in other words: draft) types because of their huge capacity and calm temperature. They think the cross-breeds are too small and sensitive for this kind of work. The 29% of the contractors use *Hungarian Muraközi* type, the reason for this is the above mentioned features. The third most commonly used horse breed with 14% is the *Percheron* which is the French cold-blooded horse. Other used horse breeds in the forests are *Hungarian cold-blooded* and *Nonius*. For every contractor the reason to use horses is tradition and harmless work. Most of them learned from their father how to train horses for logging.

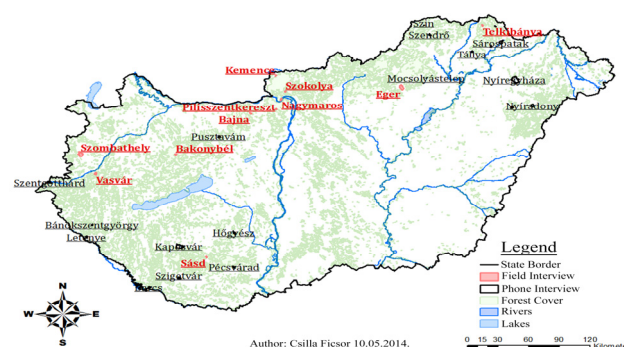


Figure 1. Headquarters of forestries that apply horse logging in Hungary (2013)

The capacity of horses depends on many factors, for example the relief, the weather, the consumed forage and the team-work. That is why their capacity has a scale with wide range. The next diagrams shows the average capacity of a single horse during a single day and its frequency (Figure 2).

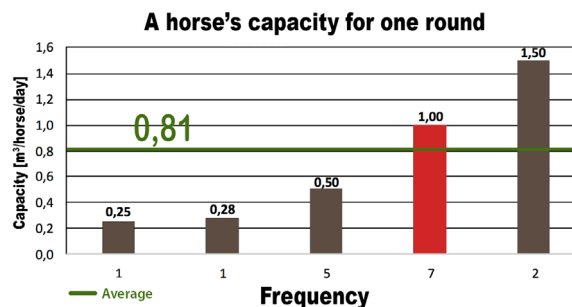
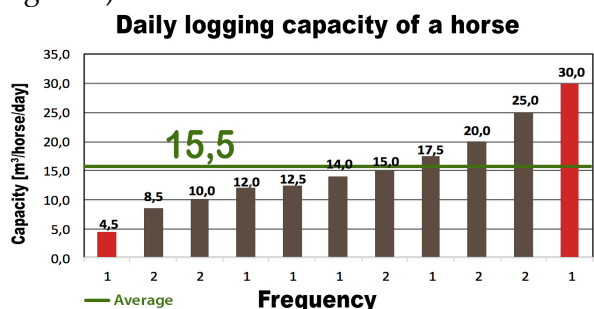


Figure 2. Daily average capacity of a single horse and its frequency

Figure 3. The quantity which is pulled by a horse for one round and its frequency

The average daily capacity of a single horse is 15.5 m<sup>3</sup>. The daily capacity of a single horse has a wide scale from 4.5 to 30 m<sup>3</sup>. The smallest capacity found was 4.5 m<sup>3</sup> because that area had steep topographic relief and covered by snow which made the conditions difficult. The largest achieved amount of logged timber was 30 m<sup>3</sup> where the conditions were really favourable: plain area, dry weather with 5 workers. The average quantity which a horse, if capable of, in one round is 0.81 m<sup>3</sup>. The most common capacity of a horse was 1 m<sup>3</sup> timber for one round (Figure 2). The most common way to make the log move is to drag it with a chain or a rope to the horse.

Table 1. Observed factors of horse logging and its averages (Feb-Oct. 2013)

Forestry	Extinction of the area (ha)	Quantity logged by 1 horse during 1 day (m <sup>3</sup> )	Quantity logged by 1 horse for 1 round (m <sup>3</sup> )	Used horse breeds	Number of horses	Number of workers	Protected natural area
Egri	23.0	12.5	0.28	Percheron	2+1	3	Yes
Egri	5.5	17.5	1.50	Hungarian c.-blooded <sup>1</sup> , cr.-breed <sup>2</sup>	2	4	Yes
Nagymarosi	7.4	20.0	1.00	cr.-breed <sup>2</sup>	2	5	Yes
Telkibányai	0.5	15.0	1.00	Muraközi	2	3	Yes
Telkibányai	2.5	10.0	1.00	Nonius, Hungarian c.-blooded <sup>1</sup>	2	3	Yes
Pilisszentkereszti	4.5	15.0	1.00	Belgian and Hungarian c.-blooded <sup>1</sup>	2	3	Yes
Királyréti	5.5	25.0	0.50	Belgian c.-blooded <sup>1</sup>	3	5	Yes
Sásdi	2.5	12.0	0.50	cr.-breed <sup>2</sup>	2	5	Yes
Kemencei	7.5	8.5	1.00	cr.-breed <sup>2</sup>	2	2	Yes
Bajnai	15.9	4.5	0.50	cr.-breed <sup>2</sup> , Hungarian c.-blooded <sup>1</sup>	2	3	Yes
Vasvári	5.0	30.0	1.50	cr.-breed <sup>2</sup> , Muraközi	2	3	No
Bakonybéli	2.0	10.0	1.00	Percheron	2	3	Yes
Bakonybéli	3.0	8.5	1.00	Muraközi	2	2	Yes
Szombathelyi	6.5	20.0	0.50	cr.-breed <sup>2</sup> , Muraközi	2	2	Yes
Mátraszőlős	5.0	25.0	0.50	cr.-breed <sup>2</sup>	2	3	Yes
Cserépváralja	0.5	25.0	0.50	cr.-breed <sup>2</sup>	2	3	No
Pécsi Parkerdő	80.0	14.0	0.25	cr.-breed <sup>2</sup>	1	2	Yes
Average	6.05	15.5	0.81	cr.-breed <sup>2</sup>	2	3	Yes

<sup>1</sup>: cold-blooded; <sup>2</sup>: cross-breed

The result of the interviewed owner of an iron horse was to create concept about another so called environment-friendly skidding method with machines. The capacity of an iron horse during one day is 10 m<sup>3</sup> timber and for one round it is able to haul 1.5 m<sup>3</sup> in the timber trailer according to the contractor. Its advantage compare to the real horse that it is considered to be a much more comfortable work method because the owner do not have to feed and handle the machines on day offs. Also the consumption of fossil fuels is part of this equipment, additionally it have larger effect on the environment.

## 5. CONCLUSION

After the field observations, the surveys and the literatures the following consequences can be made: the main advantage of horse logging is that it is harmless for the topsoil, the wood stand and saplings. It does not hinder the grove of the saplings since it makes less damage to the topsoil. In those forests, which has dense stand, horses could manoeuvre easier than machines and leave more wood untouched. Its environmental significance is that no harmful substance emission occurs, no harmful fuel presents and the forage consumed by the horse can be produced by the contractors or the locals as well. This fact correlates with the principles of sustainable development. Another advantage of this method is that it provides possibilities for the native horse breeds and types. The horse logging is a nature- and eco-friendly method of transportation of logs which is required mainly in protected natural areas.

The main disadvantage of this method is that the capacity of horse logging is less than that of the machines. The contractors have to find other jobs during the vegetation period while the timber extraction is paused and have to feed their horses without a reasonable income by them. It takes rather significant time to travel to the working area with horses and it creates more liability. Other significant difficulty is that few people exist who has knowledge and experience, will and ability to work with horses, moreover working with them requires a specifically strict and hard way of life.

It is highly advised to invest money into developing the equipment of horse logging, an advisable case shall be to look up on British samples (<http1>). Developed equipment would increase the efficiency of horse logging and decrease the differences of output values between machines and horses. 16 out of 17 investigated horse owners use the traditional Hungarian horse harness, which is great still not the perfect choice for those jobs that require exceptionally heavy traction force because the hauled weight focuses on their chest and compress their lungs. In cases when traction force over mobility is required, the collar harness - which is more common in Western-Europe - instead of the traditional Hungarian horse harness would be more favourable.

Not expanded stands by machines has wilderness stages and could be revealed by horses without excessive damage. This could be concerned as an advantage or disadvantage of horse logging depending on the aspect of the viewer. Horse logging is overall a still viable and evermore sustainable method within forestry, it has benefits for the forests, and gives possibilities for the people who work in the field of timber extraction.

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