FACTORS INFLUENCING THE ECONOMY OF HORSE BREEDING AND HORSE HUSBANDRY

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Abstract:

In this article, the costs of the chain horse breeding and horse rearing with subsequent riding horse training are analyzed in addition to the sale revenues on horse auctions. In particular, it is highlighted to which extend the individual revenue and cost components can fluctuate. Furthermore, it is estimated which of these positions decisively influence the profitability of horse breeding using stochastic simulations. Essentially the horse breeder is faced with a trade-off between more likely but not excessive losses most years against fewer or even remote chances of a high or even a very high sale price and profit. The enterprise is very similar to a gamble or playing the lottery. As expected, the selling price of the trained horse is the decisive factor for the economic success of horse breeding and horse husbandry, changes in individual cost positions have a significantly lower effect on the profit.

1 Introduction

The professional horse breeding has the goal to provide high quality horses. Here, the market is divided. On the one hand, horses are needed for leisure horse riding, and on the other hand for competitive horse sport. The latter achieve a considerably higher price level than the recreational horses. The high-quality horses are traded, for example, on auctions. In order to be able to compete here, the breeding stock has to be laid with the breeding of an own high-quality young broodmare or the purchase of a high-quality young broodmare. The sale of the offspring can again take place through the horse auctions. The prices achieved at auctions set a frame for price orientation.

The aim of this article is to take a closer look at the distribution of the prices achieved at the auctions and to show the probability of competitive sports horse sale prices. Obviously only a relatively small number of horses generate high sales revenues. Subject of the economic analysis are the costs of the chain horse breeding, horse rearing and subse-

quent riding horse training as described in a previous paper, a contribution to the 7th Horse workshop in Uelzen, Germany in 2014[1]. Particular attention is now being given to the extent to which the individual cost components can fluctuate and thus affect the economic viability of the horse husbandry. Finally, statements are to be drawn as to which extent auction prices for high-quality horses are sufficient to cover production costs.[2]

The data base for the following presentations is the KTBL “horse data base” - "Pferdehaltung - Planen und kalkulieren" from the year 2012 (KTBL 2012). The prices indicated for operating resources have been updated, however.

2 Costs for Breeding, Rearing and Training of Horses

In order to be able to carry out a horse breeding at a high level, as a basic stock a high quality young broodmare is necessary. With prices of up to more than 10,000 € per broodmare, the cost of raising an individual foal is often already higher than the market revenues for most of the foals. In the years 2014 and 2015 for example, the average auction price for riding horse broodmares was 17,496 € per animal (FN, 2015). If this value is used as an average purchase price for young broodmares, the reproduction costs add up to 3,237 € per produced foal [3] or 25% of all costs in the horse breeding section (Table 1). For insemination, the following risk analysis assumes a range for sperm costs of 375 € to 1,500 € per foal produced, with an average of 836 € per foal.

[1] Fuchs C.: Ökonomie der Pferdehaltung. Tagungsband zum 7. Pferdeworkshop Uelzen 2014. In: DGfZ-Schriftenreihe Heft 64 (ISSN 0949-8842), Bonn 2014, S. 23-32.
[2] A first version of this article was presented at the “8. Horse Workshop 2017 – 14./15. February 2017, Bad Bevensen, Germany” and was then recalculated. Fuchs C., J. Kasten und S. Breiter: Einflussfaktoren auf die Wirtschaftlichkeit der Pferdehaltung, Tagungsband zum 8. Pferde-Workshop Bad Bevensen 2017, In: DGfZ-Schriftenreihe Heft 71 (ISSN 0949-8842), Bonn 2017, S. 18-30.
[3] It is assumed to use a broodmare up to ten years and the performance could vary between be 0.5 to 0.8 foals sold p.a.

Table 1: Average Costs in Horse Breeding, Horse Rearing and Horse Training (€ per horse or in %)

Cost position	Horse breeding, one foal		Horse rearing, duration 2,5 years		Horse training, duration 6 months		Total (one competitive sports horse)	
Reproduction costs (young broodmare)	3,237 €	25%					3,237 €	12%
Insemination	836 €	7%					836 €	3%
Veterinarian, medicines	710 €	6%	469 €	6%	144 €	2%	1,323 €	5%
Feed	1,531 €	12%	839 €	11%	296 €	5%	2,666 €	10%
Straw	324 €	3%	183 €	2%	97 €	2%	605 €	2%
Water, energy, interest rate, etc.	988 €	8%	683 €	9%	579 €	9%	2,249 €	8%
Other (Farrier, etc.)	575 €	4%	313 €	4%	143 €	2%	1,030 €	4%
Insurance, fees	242 €	2%	215 €	3%	111 €	2%	568 €	2%
Labour and machinery costs	2,111 €	16%	2,199 €	29%	4,074 €	65%	8,383 €	31%
Stable buildings, riding/competitive facilities	2,260 €	18%	2,804 €	36%	855 €	14%	5,919 €	22%
Total	12,814 €	100%	7,704 €	100%	6,299 €	100%	**26,817 €**	**100%**

Source: KTBL, 2012; FN 2015; Own calculations

The most important cost positions are shown separately for the three sections, firstly horse breeding, secondly horse rearing and thirdly riding horse training separately (Table 1), and summed up in Figure 1. In addition to the typical cost positions for breeding, reproduction and insemination, a second cost block is displayed. This includes the costs for veterinarian and medication with a total of 1,323 € per competitive sports horse or 5% share, in addition costs for feed of 2,666 € or 10%, for straw 605 € or 2%, for water and energy 2,249 € or 8%, for the blacksmith etc. 1,030 € or 4% as well as for insurance and fees 568 € or 2%. The values for the last-mentioned cost items may considerably fluctuate due to the health status of the horse (veterinary costs) or the market situation (feed prices). This is to be further evaluated in the subsequent risk analysis.

A third cost block is the labour costs and the costs of the building. The investment in buildings usually fixes the capital costs for the buildings and the cost of labour for a long time and thus is hardly adjustable. The cost of labour amounts to 8,383 € per competitive sports horse or 31% and the building costs with 5,919 € per competitive sports horse or

22% are the two highest cost positions in the chain of horse breeding, horse rearing and subsequent riding horse training.

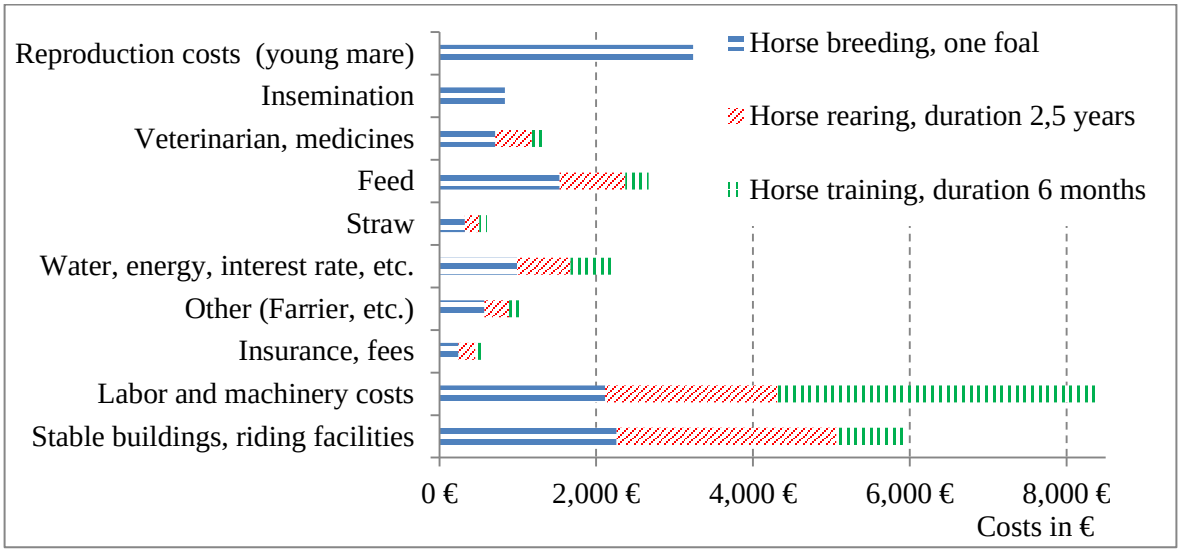

Figure 1: Costs for Breeding, Rearing and Training for a Competitive Sports Horse in €
Source: KTBL, 2012; FN 2015; Own calculations

The amounts stated here apply to cases of construction of new buildings with at least 20 horse places[4], sizes where most of the economies of scale are utilized. Wage is calculated with 13 € per hour for farm workers and 20 € per hour for horse training. In practice, however, there are also a large number of horse breeders with only a few broodmares, whereby, especially when the horses are kept in farms, it can be assumed that building costs can be much lower than calculated here. For these cases with a small "cost block" of labour and buildings, a separate analysis is presented at the end of this article.

On the basis of the calculations presented so far, the minimum cost of a foal is 12,814 €, the subsequent rearing increases the costs by 7,704 €, which would increase the minimum price for a young horse to 20,518 € and following a six-month training - a further 6,299 € will be added – the production of a competitive sports horse will cost 26,817 €. These costs should be covered by revenues and in some cases even a profit can be achieved, as the evaluations of the auction sales prices for competitive sports horses show.

[4] For the calculations, the stable systems of the KTBL are taken into account for 20 broodmares or 24 rearing horses or 28 stable places in the training enterprise.

3 Development of the Horse Auctions

While in the years 1972 to 2007 the number of riding horses sold on auctions as well as their average prices tended to increase, a turn has been observed since then. Although the average prices per horse are still comparatively high at 22,112 € (2015), the number of horses traded since 2007 has decreased by about one third (Figure 2).

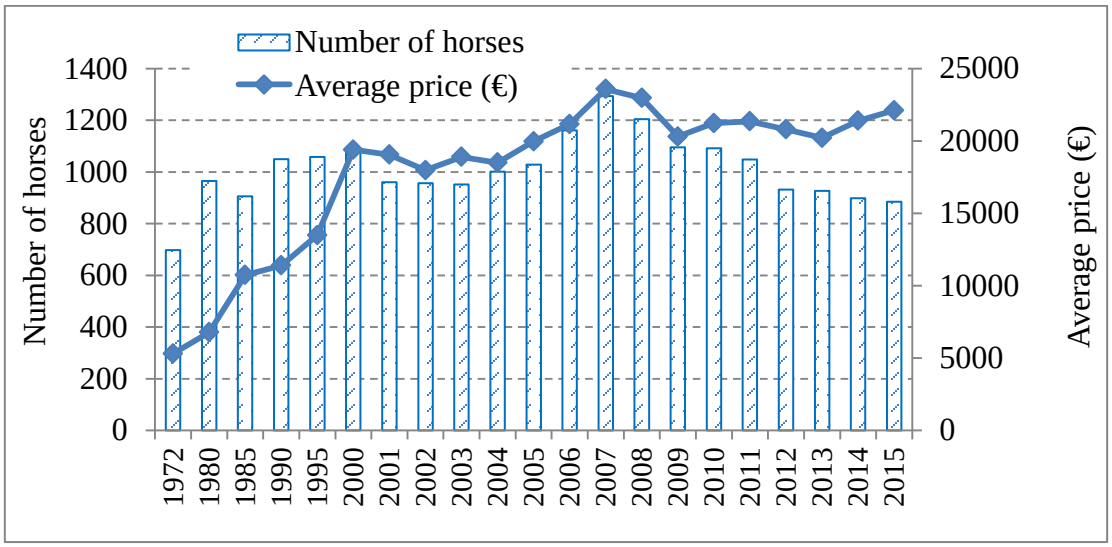

Figure 2: Development of Riding Horse Auctions in Germany

Source: FN Annual Report 2015, p. 462

A more detailed look is given in Table 2, which shows the wide range of prices achieved in all three categories: the foals, the broodmares and the riding/competitive sports horses.

Table 2: Summary Overview of Horse Auctions 2014 and 2015

Category	Sold horses		Highest price €		Lowest price €		Average price €	
Year	2014	2015	2014	2015	2014	2015	2014	2015
Riding horses	898	884	220,000	310,000	5,500	5,500	21,394	22,112
Broodmares	24	19	80,000	22,000	8,000	7,000	21,437	13,554
Foals	897	978	80,000	110,000	1,800	2,000	7,594	8,711

Source: FN Annual Report 2015, p. 465

Further analyses are necessary for the risk analysis to be carried out here. For example, the prices of competitive sports horses at the auctions in Vechta, Verden and the Westphalian Elite Auction show an extremely skewed distribution (Figure 3): While about 60% of the 164 horse sales evaluated here achieved a purchase price of less than 25,000 €, only 10% had a price of over 50,000 € up to 370,000 €[5].

[5] The highest prize was won by the horse * Sir Olli, ancestor Sir Donnerhall I - Florestan I - Landadel, on the elite auction Vechta.

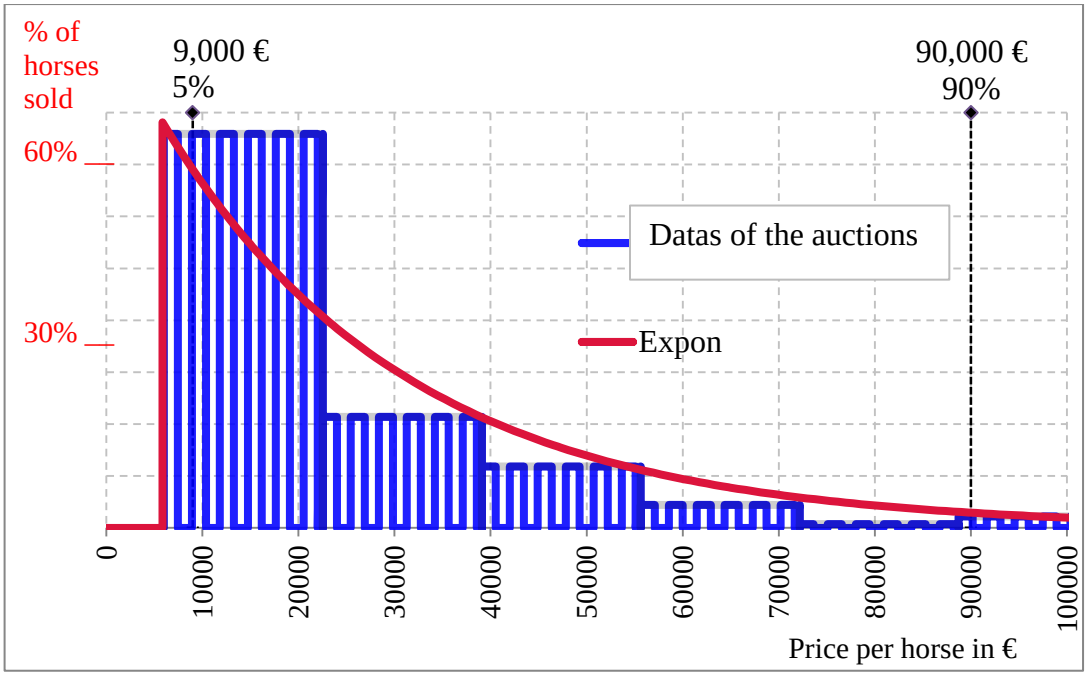

Figure 3: Distribution of the Prices of 164 Competitive Sports Horses at the Auctions 2016 in Vechta, Verden and Westphalian Elite Auction

Source: http://oldenburger-pferde.net/; http://www.westfalenpferde.de/; http://www.hannoveraner.com/

4 Factors Influencing Profitability

4.1 Volatility of Prices for Equipment and Production Factors

At this point, the various influences of fluctuating costs and sales prices are summarized, and a stochastic simulation is used to assess the factors which are responsible for the economic risk. As already explained, the feed costs depend on the market situation and the volatility observed here has increased significantly in the last decade. The price fluctuations are assumed to be triangular distributions, since it can be assumed that very low prices as well as very high prices occur relatively rarely, so that a medium price level is usually found. The triangle distributions are each characterized by a minimum, e.g. 5 € per 100 kg (= 1 dt) of hay silage, a most frequent value (mode), e.g. 5.50 € per dt of hay silage and by a maximum, e.g. 9.50 € per dt hay silage. From this (oblique) distribution an average value of 6.67 € per dt hay silage results. Correspondingly, the distribution has been made for the prices of other feedstuffs as well as straw (Table 3).

Table 3: Distribution Parameters of Triangle Functions for Feed Prices

Feeding stuff (€ per 100 kg fresh weight)	Min.	Modus	Max.	Average
Hay silage bale	5	5.50	9.50	6.67 €
Hay	6	8	15.00	9.67 €
Straw	4	6	10.00	6.67 €
Grass (pasture)	2	3.50	5.50	3.67 €
Broodmare compound feed	30	42.5	52.50	41.67 €
Foal starter concentrate	40	63	65.00	56.00 €
Foal compound feed	30	44	52.50	42.17 €
Oat grains	14	18	25.00	19.00 €
Summer barley grains	14	18	25.00	19.00 €

Source: KTBL, 2012; Own calculations

For the veterinarian and medicines costs as well as for insurance and fees, already mentioned in Table 1, it is assumed that costs from 25% lower costs up to a doubling of costs could occur. Further random deviations of +/- 25% are assumed for the labour time requirement as well as the machine costs; all distributed according triangle functions.

The purchase prices for broodmares and the sales prices for competitive sports horses are taken over according to the results of the competitive sports horse auctions 2014 and 2015 (FN, 2015) and simulated according to an exponential distribution (Figure 3)

- for broodmares: minimum 7,500 € and average value 17,496 € per horse,
- for competitive sports horses: minimum 5,500 € and average 21,753 € per horse.

As an example the variation of the yearly produced number of foals is given in Figure 4. The calculation follows a triangular distribution with minimum 0.5 foals, median 0.6 foals and maximum 0.8 foals p.a. The average amounts to 0.63 foals per broodmare and year, which is approximately the average from literature (KTBL, 2012).

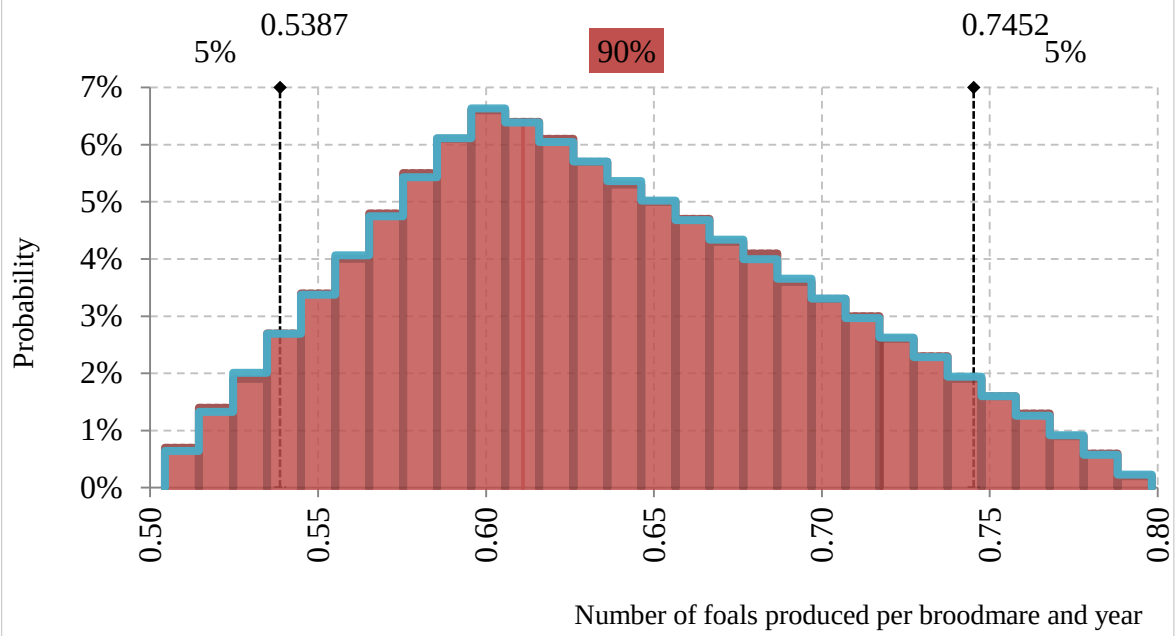

Figure 4: Assumed Distribution for the Number of Foals Produced per Broodmare p.a.

Furthermore, it is assumed that the prices of broodmares and of their sports horse off-spring are correlated with a factor of 0.5 (Figure 5)[6]; from an excellent broodmare a high-quality riding/competitive sports horse is expected more likely.

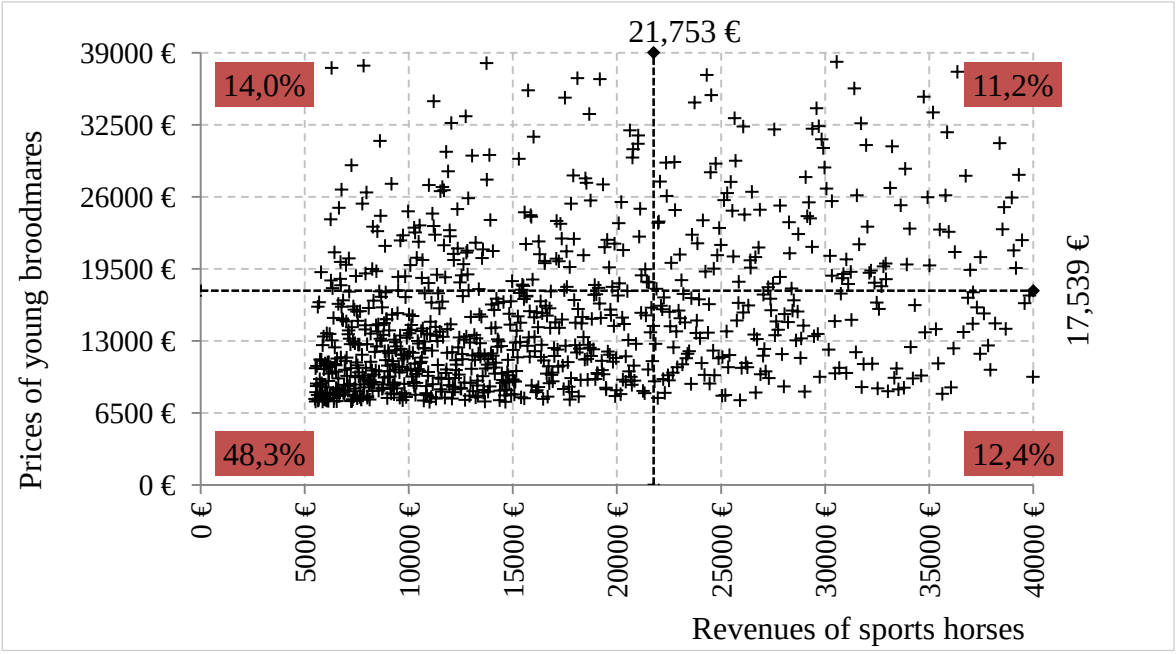

Figure 5: Prices of Young Broodmares (Average 17,539 €) Compared to the Revenues of Sports Horses Off-Spring (Average 21,753 €) (Correlation 0.5; 1,000 Simulations)

[6] There is additional research needed to validate this assumption.

4.2 Variation of Production Costs

In 90% of the cases (100,000 simulations), the cost of breeding, rearing and training a competitive sports horse is between 23,000 € and 30,000 € (Figure 6). In anticipation of the following profit calculation, it can thus already be stated that these amounts are far above the sales prices which can be achieved, and accordingly a profit will be achieved correspondingly rarely.

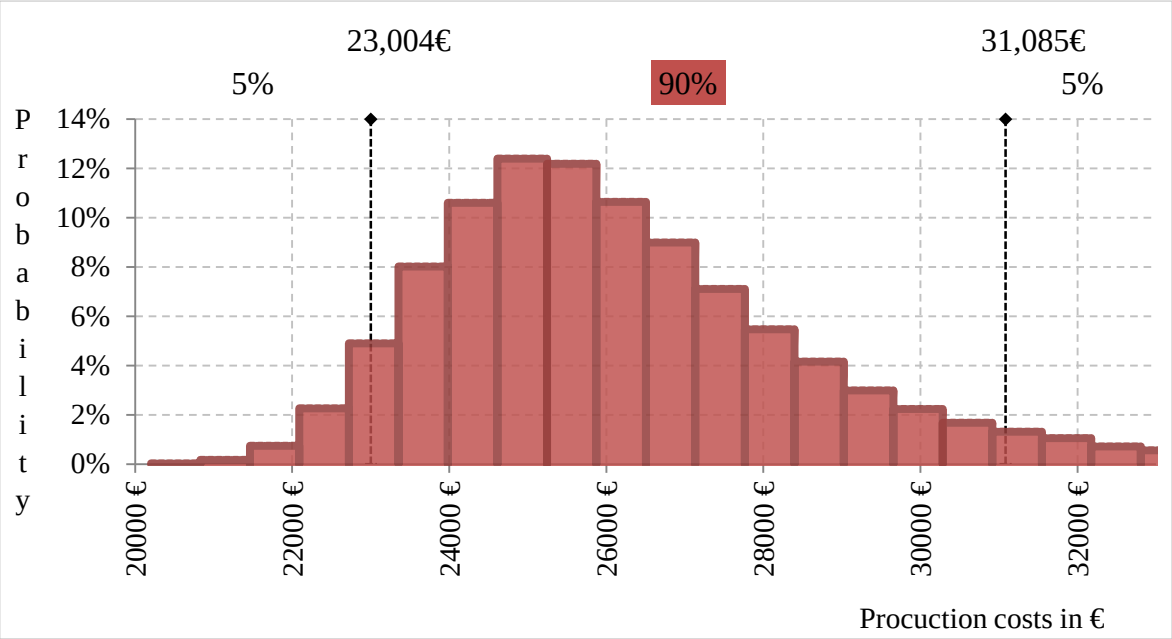

Figure 6: Distribution of the Production Costs of Breeding, Rearing and Training a Competitive Sports Horse (100,000 simulations)

The variation of the full production costs for horses shown in Figure 7 results from the assumed triangular distributions of the prices for equipment as well as the prices for stock supplementation in horse breeding. The significance of the individual cost items in terms of the variation of the total costs can be analysed with the aid of the regression coefficients. It turns out that the price of the young broodmare has the greatest influence; it can fluctuate considerably, as the analysis of auction prices has shown. In addition, labour costs, hourly wages, insemination costs as well as the veterinarian and medication costs, followed by feed costs, have a decreasing effect on the variation of the total costs, in the order mentioned (Figure 7). This is due, on the one hand, to the assumed fluctuation range of the prices of the individual production factors, but also to their share of the total costs per competitive sports horse.

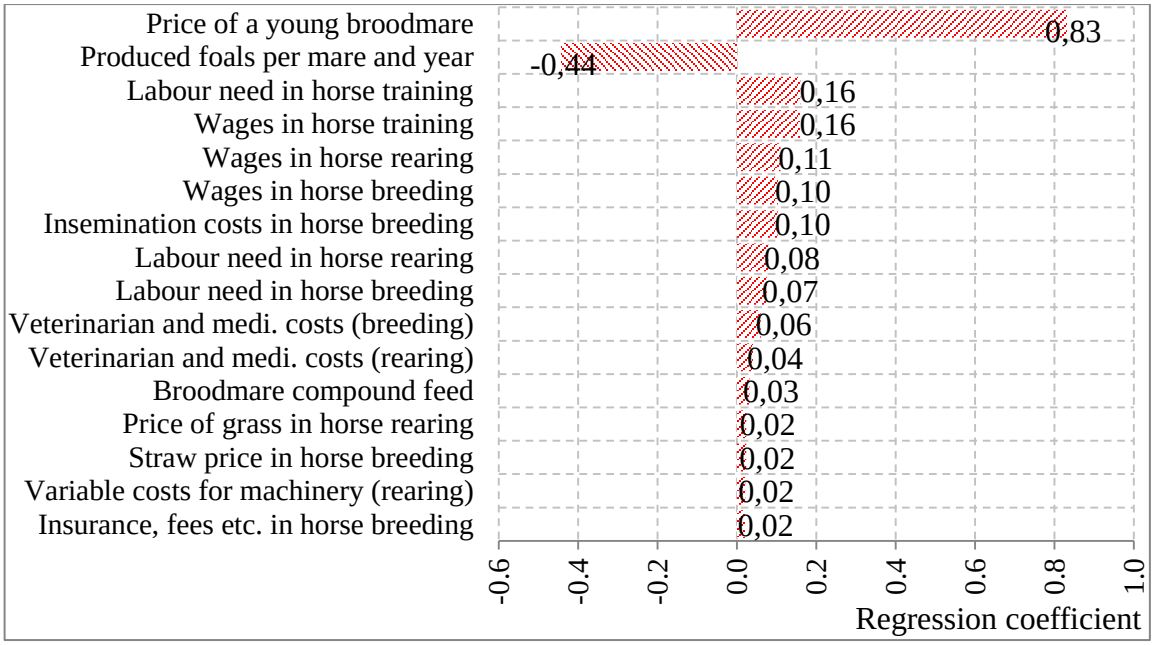

Figure 7: Regression Coefficients of Individual Cost Positions with Respect to the Total Production Costs (sum of the cost of breeding, rearing and training a riding/competitive sports horse; 100,000 simulations)

4.3 Variation of Profits

The profits to be obtained, calculated from the difference in revenues (corresponding to a price level attainable at the auctions) and the sum of the costs of breeding, raising and training a competitive sports horse, are in average -4.389 € and negative in more than 70% of cases. Under the conditions assumed here losses in the keeping of horses are achieved (Figure 8).

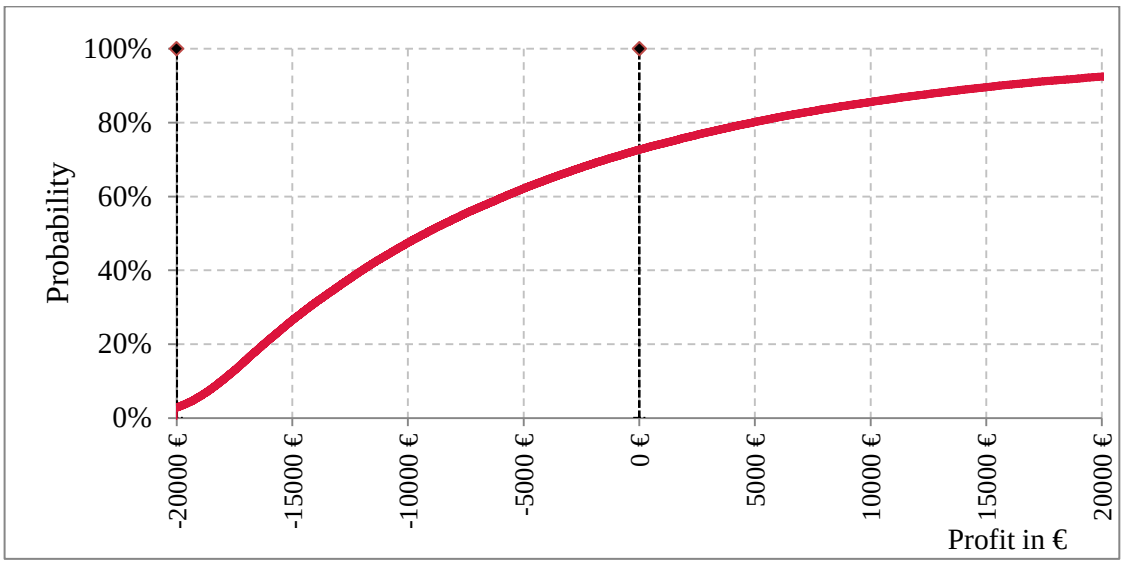

Figure 8: Distribution of Profits when Selling a Competitive Sports Horse (at a price level attainable at auctions); 100,000 Simulations

How the losses could be divided between the participant in the section breeding, rearing and training of a horse is not to be speculated at this point. However, it is interesting to know which factors have a particularly strong influence on the economy, in particular the profit. To this end, the regression coefficients of the individual components of prices and of costs are again considered (Figure 9).

The highest impact on the profit is expected to be the selling price of the trained competitive sports horse, followed by the purchase price of the broodmare. But the latter only with a coefficient of -20%, that means the better the breeding mare, the higher the profit. The influence is so small, because the model assumptions already stipulated that a correlation (0.5) should exist between the broodmare price and sales prices of the resulting competitive sports horses. The subordinate influencing factors correspond to the positions already mentioned in cost analysis. They are of minor importance compared to the prices for the animals. The conclusion to be drawn from this is that it is not possible to save as many costs as could be earned on a high-quality and correctly market placed horse. Even a halving of the most important cost positions is not a means of countering low selling prices, as the following concluding chapter shows.

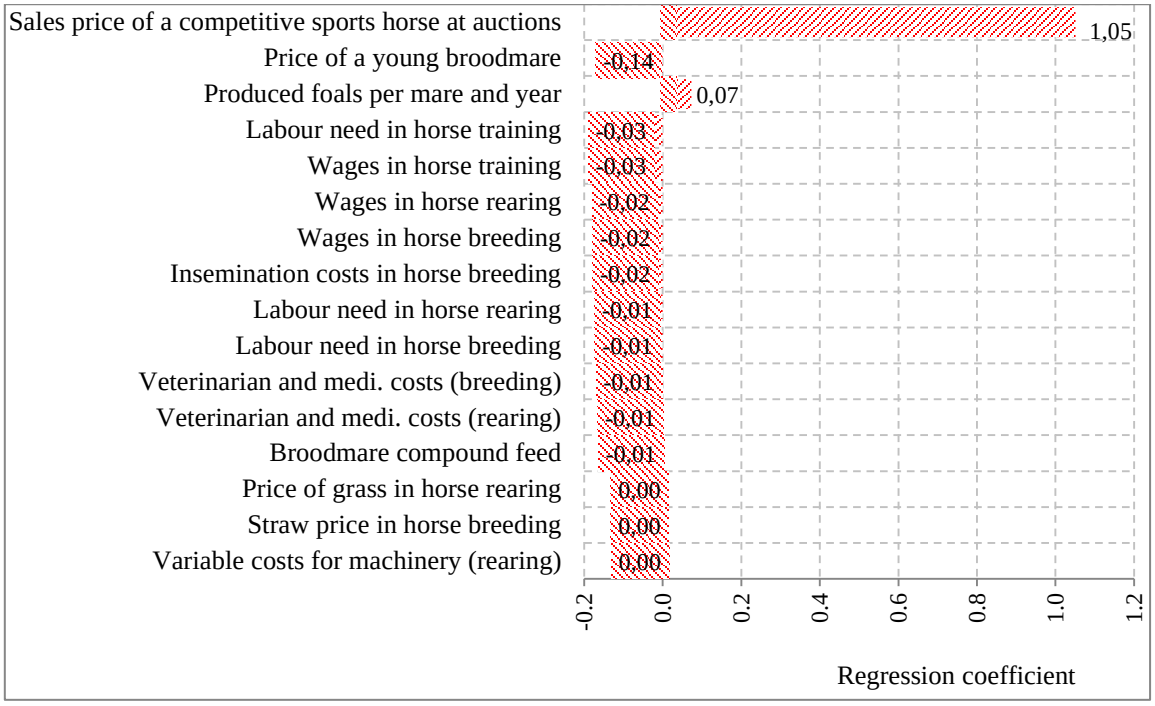

Figure 9: Regression Coefficients of Individual Variables with their Influence on the Profit after Breeding, Rearing and Training a Competitive Sports Horse at Sale at the Prices Attainable at Auctions (100,000 simulations)

5 Cases with Lower Fix Costs

As already mentioned above there are in practice many horse breeding farms with only a few broodmares, for which the building of a new stable would be unprofitable. They usually use existing old buildings or find cost-efficient conversion solutions for old farm buildings. For these cases the framework of the calculations is changed and building costs are cut by half. Moreover, in this additional consideration of horse breeding in small stands, which is often a hobby only, lower labour costs are also assumed, so they are also cut by half. For these cases with a lower "fixed costs" block of labour and building costs, but also lower costs for forage and straw, the following costs are obtained (Figure 10):

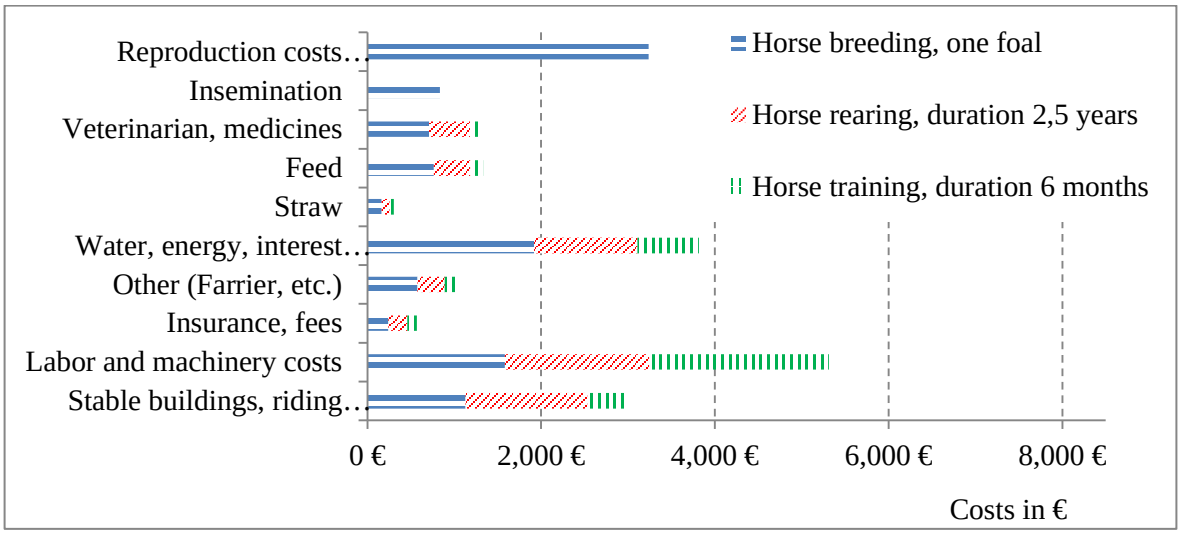

Figure 10: Costs for the Breeding, Rearing and Training of a Competitive Sports Horse in the Case of a "Small Agricultural based Horse Breed" (with cost cuts for labour, buildings, forage and straw; half costs compared to Figure 1)

The difference between the full cost calculation and the cases with relatively low operating costs for the operating resources is, according to the assumptions made here, approximately 6,000 € / competitive sports horse (Table 4). The minimum costs for the production of a high-quality competitive sports horse are still far above the market prices for a large part of the traded horses, even if the costs for labour, buildings, forage and straw are low.

Table 4: Costs and Break-Even Prices in Comparison of a full Cost Calculation with a "Small Agricultural Horse Breed" with Cost Cuts for Labour, Buildings, Forage and Straw

Production variant (two scenarios)	Horse breeding, one foal	Horse rearing, duration 2,5 years	Horse training, duration 6 months	Break-even price for a high quality competitive sports horse (Total)
1) All costs covered (Figure 1)	12,814 €	7,704 €	6,299 €	26,817 €
2) Small agricultural based horse breeders (some costs cut by half; Figure 7)	11,155 €	5,763 €	3,797 €	20,715 €
Difference	-1,659 €	-1,941 €	-2,502 €	-6,102 €

Source: KTBL, 2012; FN 2015; Own calculations

On average horse production will become a profitable business, the average gain raises to 1.625 € per competitive sports horse sold for prices similar achieved on auctions. Nevertheless, the profit distribution of the once more operated stochastic simulation shows that still about 60% of the smaller agricultural horse breeders achieved a loss, while about 40% of the cases are able to achieve a profit (Figure 11). In the latter cases, even with low costs for labour, buildings, forage and straw only part of the costs can be covered.

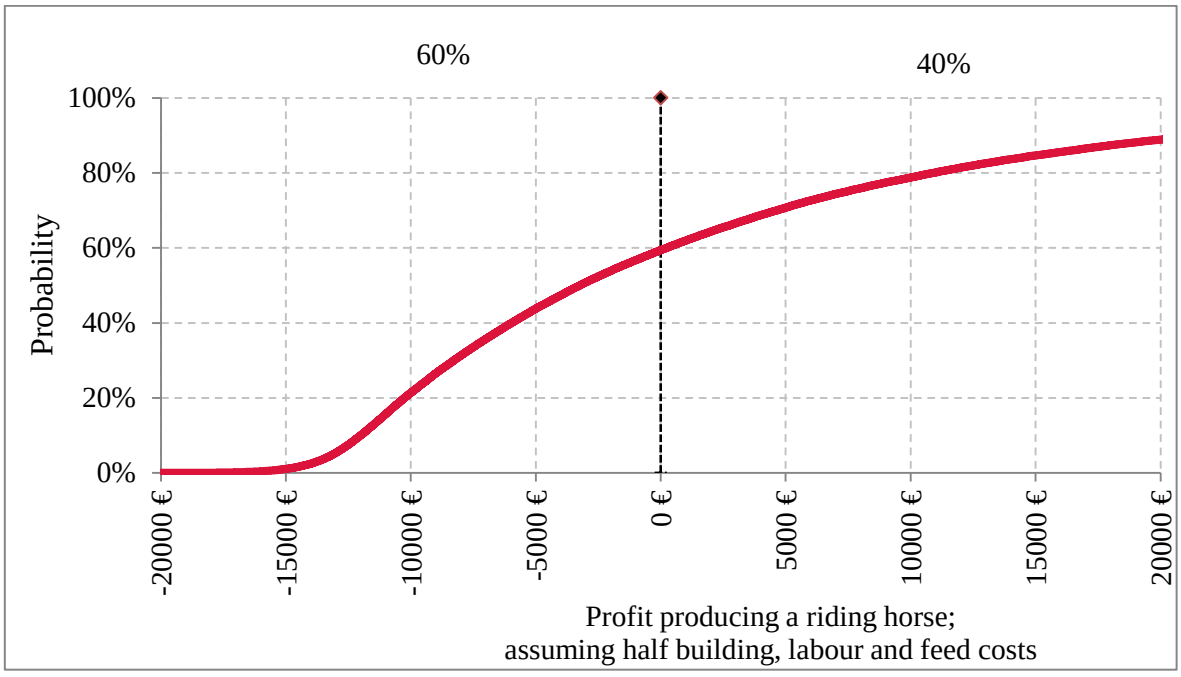

Figure 11: Distribution of Profits when Selling a Competitive Sports Horse (at a price level attainable at auctions) with Lower Building, Labour and Feed Costs, 100,000 Simulations

Summarizing, it can be concluded for all horse breeders, even if they utilize the advantages of an agricultural holding, high economic viability can only be reached with high revenues for the competitive sports horses, for all other cases it can be stated:

Horse care is in many cases a beautiful, but also expensive hobby!

The author would like to thank two anonymous reviewers for their helpful comments.

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