



Work organisation in the production of slaughter pigs on Hungarian and Japanese pig farms

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ABSTRACT

The production of slaughter pigs is a particularly important branch of Hungarian agriculture. Indication of this can be observed in the fact that pig meat accounts for 20-22% of all agricultural exports from the country. In the past 25 years particularly specific changes have taken place in the production of slaughter pigs in Hungary; these manifest themselves extensively in the respective variations of keeping technology, mainly in procedures related to animal feeding and nutrition. The authors provide a detailed account of the investigations performed on various farms for the purpose of exploring solutions and variations for work organisation to be considered optimal from the economic aspect. In the course of these investigations the role of the various factors influencing quality was applied as an important aspect, as was the unearthing of experience and observations related to the introduction into use in Hungary of the EUROP meat classification system. Japanese pig farming was also studied from the aspect of work organisation. Special emphasis was laid on the production of slaughter pigs and work organisation solutions. A comparison was made between Japanese and Hungarian pig farms with a case study on four Hungarian, one American and four Japanese farms.

(Keywords: pig production, work organisation, work efficiency, Hungary, Japan)

ZUSAMMENFASSUNG

Die Arbeitsorganisation in der Schlachtschweineproduktion in ungarischen und japanischen Betrieben

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Die Schlachtschweinproduktion ist ein ausgesprochen wichtiger Zweig der ungarischen Landwirtschaft. Dies wird dadurch bestätigt, daß das Schweinefleisch einen 20-22%igen Anteil am gesamten landwirtschaftlichen Export hat. In den vergangenen 25 Jahren kam es zu spezifischen Veränderungen in der ungarischen Schlachtschwein-Produktion, hauptsächlich bei der Haltungstechnologie und den Zuchtmethoden. Die Verfasser berichten ausführlich über die Untersuchungen, die in verschiedenen Betrieben durchgeführt wurden, um optimale arbeitsorganisatorische Lösungen zu finden. Im Rahmen der Analyse wurden die Kriterien der am meisten verbreiteten Masttechnologien (Fütterungsmethoden) aufgearbeitet, die auch mit Hilfe einer

ausführlichen Arbeitstagsaufnahme bewertet wurden. Während der Untersuchungen wurden besonders die qualitätsbeeinflussenden Faktoren und die Erfahrungen bei der Einführung der EUROP-Handelsklassen berücksichtigt. Auch die japanische Schweineproduktion wurde aus der Sicht der Arbeitsorganisation in einem Großbetrieb untersucht. Besondere Aufmerksamkeit galt den arbeitsorganisatorischen Lösungen in der Schlachtschweinproduktion. In einer Fallstudie wurden 4 japanische und 4 ungarische Schweinefarmen sowie eine amerikanische untersucht.

(Schlüsselwörter: Schweineproduktion, Arbeitsorganisation, Arbeitsproduktivität, Ungarn, Japan)

INTRODUCTION

In Hungary slaughter pig production accounts for 54-60% of all slaughter livestock production. In the past ten years the proportion occupied by pig production has declined substantially. The pig population's density is considerably lower (5 sows per 100 ha) than the average for the member countries of the European Union. This tendency is also to be regarded as unfavourable due to the fact that, on the one hand, the agro-ecological conditions in Hungary are favourable for the production of feed concentrates. On the other hand the processing capacity of the meat industry was established on the basis of 10 million pigs. The now smaller domestic pig population has led to lower efficiency in the exploitation of the capacities available, which in turn exerts an unfavourable effect on overheads and fixed costs, and therefore on the economic efficiency of processing on the whole (Széles, 1998).

In many cases the pig production sites of the agricultural associations and cooperatives were built in the 1970s; their keeping technology systems have therefore now become outdated, and they are in dire need of modernisation and reconstruction. An indication of this is that the practice of feeding from the floor is still in use, which entails high levels of feed loss, and risk to animal health remains high; this also raises the priority of the earliest possible modernisation. In the course of the modernisation of feeding technology pig feeding methods based on the Big Dutchman system have come into increasingly widespread use.

On comparison of Hungarian and Japanese agriculture and pig farming it can be seen that there are great differences. The total area of agricultural land in Hungary is 20 per cent larger than that of Japan, but this land occupies less than 14 per cent of the total land area of Japan while in Hungary it accounts for more than 65 per cent. In the case of the number of people per 1 ha of agricultural land the difference is striking. Japan has nearly 15 times more people on 1 ha of agricultural land than Hungary. In Japan the most important branch of farming is rice production with a share of over 55 per cent, while the share of livestock farming share is only 2.9 per cent (*Japanese Ministry of Agriculture*, 1995). Agricultural production has centred around harvesting rice. This has given a number of characteristics to Japanese agriculture. Domestic livestock have never been very important in Japan.

The most notable characteristic of the livestock industry is that the number of farming households has been decreasing annually. Farm closures have been especially prevalent among small operators, and were brought by on the increasing age of those working on them, lack of successors, and the worsening environment for livestock breeding. In contrast, the number of large-scale livestock farms has increased, and the output per farm has been rising (*Nippon*, 1994).

MATERIALS AND METHODS

Work organisation systems applied in slaughter pig production were analysed on the basis of investigations performed at four Hungarian and four Japanese agricultural enterprises. In the process of collecting the data the endeavour was to create a database suitable to serve, with the application of a computer-installed facility, as the base for the formulation of a wide range of indicators relating to livestock breeding and also other economic indicators. Linked to this, a method involving the detailed recording of data for individual working days was used for the analysis of the structure of working time in each of the respective areas of work activity, which also involved the application of a computer-based procedure.

RESULTS AND DISCUSSION

Table 1 shows the number of employees, the number of sows and litter size on the selected farms.

Table 1

Number of employees, number of sows and litter size on various farms, 1992-97

Figures of	Csákvár farm	Barcs pig farm	Somogy-szil	Rácegres farm	Suzuki pig farm	Sato pig farm	Koyama farm	Morita pig farm
Number of employed workers (1)	41	28	18	8	23	30	2	5
Mean stock of sows (2)	1353	730	252	112	2100	2000	76	466
Litter size, piglets per sow (3)	9.48	9.10	9.44	9.45	10.99	10.22	9.50	9.82

1. Tabelle: Anzahl der Mitarbeiter, Anzahl der Sauen und Wurfgröße in verschiedenen Betrieben 1992-97

Anzahl der Mitarbeiter(1), Anzahl der Sauen(2), Wurfgröße pro Sau(3)

In regard to the main technological features of the keeping of animals on the farms examined the following differences were found. Of all the farms observed only two of the Hungarian farms - the small and the medium-sized one - used straw bedding. All the other farms had a liquid manure slurry system, which is more favourable as it requires less manpower, but on the other hand it is more hazardous to the environment. The American farm uses the largest amount of water among the farms due to the water flushings. With natural ventilation and lighting a considerable amount of electricity can be saved, but in order to achieve this not only a milder climate but also a specific building design is necessary. Winters are harsher on Sato farm in Iwate prefecture and also in Csakvar farm in Hungary, so ventilation and lighting are mainly ensured artificially. On two Japanese farms - the Suzuki and the Morita farm - both ventilation and lightning are supplied naturally, as on the smallest Hungarian farm, Racegres (*Fejes-Schweigert*, 1992). Mating methods vary from farm to farm, but natural mating is preferred on two Japanese and on two Hungarian farms. One Japanese farm, the Suzuki

farm, one Hungarian farm, Csakvar, and the American farm use only artificial insemination, which is the preferred method among the largest farms examined.

On comparison of the main breeding indicators for the pig production units of the farms studied it can be seen that there are better overall results on the four Japanese farms. This is shown in *Table 2*.

Table 2

The indicators of pig production for the farms studied 1995-1997

	Csákvár Hun	Barcs Farm Hun	Somogy- zil Hun	Rácegres Hun	Suzuki farm Japan	Sato farm Japan	Koyama farm Japan	Morita *farm Japan
Piglet no. at weaning (1)	7.91	8.55	8.50	8.30	9.91	9.43	8.50	9.09
Sow rotation (2)	2.05	1.93	2.14	1.82	2.09	2.20	2.14	2.32
Rate of selection for sows (%) (3)	31.00	50.00	30.00	30.00	42.00	40.00	40.00	89.35
Success rate of mating (%) (4)	60.20	51.00	85.00	48.00	90.00	82.00	89.5	91.04
Piglet mortality (%) (5)	16.63	6.15	10.00	12.20	9.90	7.70	10.53	7.44
Fattening pig mortality (%) (6)	3.72	10.50	2.50	2.90	3.10	1.40	1.37	5.40

* The 89.35% selection rate is high, the reason for this being that last year 110 new gilts were introduced. (*Die Selektionsrate von 89,35% ist so hoch, weil im vorjahr 110 Jungsaunen eingestallt wurden.*) This was on top of the selection of old sows. (*Dieser Wert lag noch über dem Selektionswert der Altsauen.*) The many new gilts introduced also increased the sow rotation figure. (*Die hohe Zahl der Jungsaunen erhöhte auch die Sauenrotation.*)

2. Tabelle: Indexzahl der Schweinerzeugung in den untersuchten Betrieben 1995-1997

Zahl der Absatzferkel(1), Sauenrotations(2), Sauenselektion(3), Trächtigkeitsanteil(4), Ferkelverluste(5), Mastverluste(6)

These data draw attention to the fact that the greatest variation between the farms is in piglet mortality, percentages for this varying between 6.15 and 16.63%. An undesirable observation is that this indicator was found to be above 12% on two Hungarian farms, this being higher than the national average, while the Japanese results are considerably better.

Feed conversion is of particular significance in the assessment of the economic efficiency of slaughter pig production; this was examined on the basis of the quantity of diet required for the production of 1 kg live weight. Feed conversion values varied between 3.26 and 4.22 on the selected Hungarian farms, while at 3.03 to 3.60 kg the Japanese results are better again. This is also particularly worthy of consideration in the light of the view of *Kalm (1994)*. He expresses the opinion that in the countries of the European Union, in relation to the development of slaughter pig production, 2.8 kg per kg feed conversion and 750 g live weight gain per day should be the objective to be attained in the future. The present studies indicate that on the farms included in the

evaluation daily weight gain was between 443 and 610 g on the Hungarian farms, the values of 646 and 750 g on the Japanese farms representing much better results.

The methods of feeding used in the fattening houses on the farms examined can be seen in *Table 3*. The Big Dutchman type of feeder is the most popular on the Japanese farms, and Hungarian farms also tend to use this type of feeder due to the advantages it offers.

On most Japanese farms feeding is fully automatic, while on the Hungarian farms examined great manpower is required on account of the procedure of filling the feeders.

Coarse meal (either dry or wet) is fed on all the Japanese and Hungarian farms studied.

Table 3

Feeding in the fattening houses

Name of farm (1)	Short description of the method of feeding (2)
Csákvár Pig farm Hungary	Liquid feed is poured into a concrete trough from a metal pipeline system
Barcs Pig farm	Various methods: Big Dutchman self-feeders, concrete troughs and feeding on the concrete floors are all in use on the farm. First, hand wagons are filled with dry feed from the feed-storage-towers, then the employee fills up the feeders with a shovel.
Somogyszil Pig farm	Various methods: Big Dutchman self-feeders and metal self-feeder troughs. Filling procedure: from sacks to a hand wagon, and from there to the trough with a bucket.
Rácegres Pig farm	Various methods (as in Somogyszil): Big Dutchman self-feeders and metal self-feeder troughs. Filling procedure: from sacks to a hand wagon, and from there to the trough with a bucket.
Suzuki Pig Farm, Japan	Various methods: metal self-feeder troughs and feeding from the floor. Filling: automatic pipeline system. Dry coarse meal.
Sato Pig farm	Big Dutchman type self-feeders. Filling is via a fully automatic pipeline system.
Koyama Pig farm	Metal self-feeder troughs and a semi-automatic pipeline system.
Morita Pig farm	Big Dutchman type self-feeders and new round BD type self-feeders. Filling is via a fully automatic pipeline system.
PIC Ltd. Farm USA	An automated pipeline system fills up the feeding boxes with dry feed. From there it is just scraped out with a bucket and tipped onto the concrete floor.

3. Tabelle: Fütterungssysteme im Mastbetrieb

Der Name des Betriebes(1), Kurze Beschreibung des Fütterungssystems(2)

Job structure on the selected pig farms

There are various jobs on the farms examined. As farm size is increases specialisation in certain work fields is also on the increase. This is particularly true on the Hungarian farms. On average, Japanese farms employ fewer working staff than Hungarian farms. There are many reasons for this, as outlined below.

- The structure of buildings is better. On the Japanese farms the buildings were designed especially and originally for pigs, while this was not always the case concerning some buildings on the Hungarian farms.

- Differences exist in ownership structure. Although by now almost all Hungarian farms have been privatised, the attitudes of the owners are not as advanced as on Japanese farms.
- Because of the different historical backgrounds, social rules and regulations are also different.
- The degree of bureaucracy is lower on Japanese farms, but still higher than on the western competitor farms.
- The previous full employment policy in the socialist countries still has its effects, and even now more workers are employed on farms.
- More machinery is used on Japanese pig farms, and this equipment is of higher quality and a higher level of sophistication.
- In Hungary employees tend to be specialised in particular farm jobs. For example, there are machine operators or specialised persons who work only on their own field. On the other hand, Japanese employees are more universal, like American or other western employees. On western and Japanese farms family members (wife and grown up children) do the bookkeeping and administration. The vet only comes at the request of the village or otherwise once a month. In Japan pig men do the maintenance and repair jobs around the farm.
- In Japan there is enough capital for the renewal of farm equipment and machinery.
- Capital is also needed to keep up with the latest developments in various areas of pig farming, including work organisation. Japan has not only the capital but also the connections, as the USA is actually a neighbour country from which it is relatively easy to obtain new information, which is of bilateral interest, as the USA is the most important agricultural trading partner of Japan.
- Fewer workers are needed in Japan due to the very short vacations and holidays there.
- Safety rules are different, for example in the mating process. Sometimes this requires the presence of an extra person, since in Hungary only men can work with boars in the interest of avoiding accidents.
- In Japan farmers live next to the farm, so there is no need for night guards.

On Sato farm, for example, there are no night guards. After work the farm is closed and opened only in the morning. It has been calculated that the wage for the night guard would be higher than what could be saved with night work, particularly in the farrowing house. Also, there is no danger of theft in Japan.

Evaluations relating to work organisation should include consideration of variations in the length of the working day, and also of the relation between the number of staff and the number of animals. *Table 4* provides an overview of this. Concerning work efficiency in fattening houses, the Japanese Suzuki farm (which is the largest Japanese farm examined) showed the best results (almost 3900 fattening pigs per day per attendant), followed by the Morita farm, third place being occupied by Csakvar Ltd. in Hungary, which is the largest Hungarian farm examined. As farm size diminishes the results weaken. This is especially obvious with the smallest Hungarian farm examined, Rácegres. Daily working time is officially eight hours on all of the farms. However, in practice this is shorter in some places, for example at Rácegres, or else longer, as on the Suzuki farm. At the Morita farm all employees work 8 hours a day: no more and no less. This is quite an outstanding achievement the organisation of the daily work on the farm. On this farm only the owner works on Sundays. He works 2.5 hours in the morning and

1.5 hours in the afternoon, while his staff have the day off; this is also outstanding on consideration of the fact that the farm has 466 sows.

Table 4

Number of fattening pigs per attendant and daily working time on the farms examined, at the time of the study

Farm (1)	Daily number of fattening pigs per attendant (2)	Daily working hours (3)
Csákvár Ltd., farm, Hungary	2100	05.30 - 16.00
Barcs, Coop. Farm, Hungary	1060	06.00 - 15.00
Somogyszil, Coop., Hungary	450	06.00 - 11.30 14.00 - 16.45
Rácegres, Pig farm, Hungary	421*	05.00 - 10.30 15.00 - 17.30
Suzuki Pig farm, Japan	3875	6.00 - 12.00 14.00 - 16.00
Sato, farm Morioka, Japan	2083	8.00 - 12.00 13.00 - 17.00
Koyama farm, Japan	350*	9.00 - 11.30 13.00 - 17.00
Morita farm, Japan	2236	8.00 - 12.00 13.00 - 17.00

* Total number of fattening pigs on the farm (*Anzahl der Schweine im Betrieb.*)

4. Tabelle: Anzahl der Mastschweine /Mitarbeiter/ Tag und die Tagesarbeitszeit

Benennung(1), Anzahl der Mastschweine/Mitarbeiter/Tag(2), Tagesarbeitszeit(3)

Concerning some of the work efficiency figures at the following farms it can be stated that the Morita pig farm yielded the best results in terms of annual working hours per sow (23 hours) and working hours to produce 100 kg of slaughter pig (2.1 hours). This is a well managed farm with shorter working hours, there being buildings and road structures aimed at saving working time and manpower on the farm. The results from the other three Japanese farms are also very good. Among these the relatively small family farm, the Koyama farm, gave the weakest results, mainly due to the fact that it is smaller in size. It is not possible to exploit work organisation solutions as deeply on the smaller farms as on the larger farms.

In slaughter pig production an important aspect of efficiency studies is that analyses related to the utilisation of human labour should be performed. The results of these analyses are summarised in *Table 5*, in which the major work productivity indicators are outlined. It is no surprise that the large American farm with only ten workers, well designed buildings and with the excellent PIC hybrids yielded the best result; 115 sows per employee and less than 2 hours of labour to produce 100 kg of slaughter pig. The result for the Morita farm is also excellent (93 sows and 2.1 hours), together with those for the two other larger Japanese farms. The largest Hungarian farm also gave good results.

Table 5

Work efficiency figures in pig production on the selected farms in the years 1993-97

Farm	Sows per employee (1)	Working hours to produce 100 kg of slaughter pig (2)
Csákvár Ltd. Pig farm, Hungary	33	3.5
Barcs, Cooperative farm, Hungary	26	4.6
Somogyszil, Cooperative farm, Hungary	14	10.7
Rácegres Pig farm, Hungary	14	10.4
Suzuki Pig farm, Japan	91	2.3
Sato, Pig farm Morioka, Japan	67	2.2
Isamu Koyama Pig farm, Japan	38	4.3
Morita Pig-farm, Japan	93	2.1
PIC Ltd., Kansas, USA	115	1.5

5. Tabelle: Arbeitsproduktivitäts Indexe in den untersuchten Betrieben in den Jahren 1993-97

Anzahl der Sauen/Mitarbeiter(1), Anzahl der notwendigen Arbeitsstunden für die Erstellung von 100 kg Schlachtschwein(2)

The data presented in this table indicate that great differences exist between the farms both with respect to the number of sows per member of staff and regarding the number of man-hours required for the production of a 100 kg slaughter pig.

The economic efficiency and success of slaughter pig production are fundamentally determined by changes in the prevailing sales returns conditions, which are inextricably linked to quality. 1995 saw the introduction into Hungary of the EUROP meat quality classification system, which is in general use in the countries of the European Union. These data verify an improvement in quality, although modest: the ratios of the grades denoting the highest quality (S, E, U and R) increased, reaching values of 76% in 1995, 81% in 1996, and 85% in 1997. In Hungary the cause for concern lies in the fact that, despite a decreasing tendency, the proportion of meat classified into groups O and P is still high.

Concerning carcass quality measurement, the EUROP system is not used in Japan, but the following system is in operation, with the example of Iwate prefecture, where the average prices for three qualities of pork were the following in August 1998:

Back fat measurements are taken at three points: the shoulder, back and hip.

Good quality	Back fat thinner than 18 mm:	420-440 yen/kg.
Medium quality	Back fat between 18 and 20 mm:	380 yen/kg.
Low quality	Back fat thicker than 20 mm:	300-320 yen/kg.

The slaughterhouse pays this price, which does not include the 5% VAT. For the by-products the price is 1000 yen/pig. (3-5 yen/kg)

The daily average price for a good quality carcass is calculated on the average of prices at three main pig markets; for example, on Monday 8th February 1999 the price was 437 yen in Tokyo, 419 yen in Oomiya, 413 yen in Yokohama=423 yen/kg. (*Local farmers newspaper, 1999*). For example, on that day the owner of Morita farm received 388 yen/kg, representing 3.5 grade level out five.

CONCLUSIONS

The studies performed verify that in Hungary more efficient work organisation will enable the economic position in the production of slaughter pigs to be improved. It has been ascertained that the structure of working time in pig breeding is not particularly favourable, and the use in fattening units of feeding systems of types which entail wastage and losses is still characteristic of a high proportion of farms, specific feed utilisation levels remaining high. With respect to the pig meat classification system used in the countries of the European Union, on the basis of the experience of the past three years it can be ascertained that quality has improved.

In Japan feed is imported, and the manure produced causes problems, since there is no appropriate way to deal with and to utilise it completely. There is not enough agricultural land for its utilisation, especially in heavily populated areas. At present it is cheaper to buy feed than to grow it.

Concerning the organisation of daily work there are considerable differences between the Japanese and the Hungarian pig farms. It is true for pig farms in both countries that as the size of the farm increases specialisation in certain fields of work also increases. However, Japanese farms employ fewer workers, the main reasons behind this being that the structure of buildings is better, and the buildings were designed especially and originally for pigs. Differences in ownership structure, historical background, and social rules and regulations are also different. The degree of bureaucracy is also lower on Japanese farms. More and better machinery is used on Japanese pig farms. On most farms in Hungary employees tend to be specialised in various jobs, while Japanese employees are more generalised. It is also an important aspect that there is enough capital in Japan for the renewal of farm equipment and machinery. Fewer workers are needed due to the very short vacations and holidays in Japan. Furthermore, one other important difference is that Japanese farmers live next to their farm.

The Japanese are doing very well in work organisation and other areas of pig farming, while environmental protection is at a higher level in the countries of the EU. As Hungary wishes to join the EU in the near future, all the strict rules and regulations of the Union must also be implemented on Hungarian farms. Japan and the USA, on the other hand, are not bound by these and have higher levels of pollution.

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