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Towards individual feeding of fattening pigs

Individual feeding of pigs via computer-controlled feeding stations is state-of-the-art technology in dry sow units. Alongside the procedural control of feeding involved, the individual recording of data offers the possibility of automating performance control and delivers important information for the monitoring of individuals, groups and the herd. With regard to the establishment of a performance-oriented and nutritionally-adapted feed regime in feeding pig enterprises, computer-controlled individual feeding offers an interesting way of meeting economic and ecological demands. Within the framework of a research project, this technology's potential in feeding pig enterprises was investigated.

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Keywords

Fattening pigs, idividual feeding, feeding behaviour of pigs, nutrient adapted feeding, performance-oriented feeding

The success of slaughterpig enterprises depends to a great extent on the efficiency of the production technique. In this case the feed and the feeding technology have a great influence. At best with normal feeding a precise feed rationing is achieved for the average of all animals in a pen. At least in the final feeding phase, the rationing leads to competition at the trough which in turn brings about aggression and the forcing of some animals away from the feed. The dominant pigs feed then almost on an ad lib basis with the result that the weaker ones are underfed. Within the pen, this means the pigs grow at different rates and that individual performance potentials are not fully exploited.

A way of meeting such problems is the computer-controlled feeding of individual animals. The application of closed feeding stations (*fig. 1*) allows, on top of this, a quiet and undisturbed feed intake, even for the animals that are further down the pen social order [1]. Combined with the appropriate rationing technique (*fig. 2*), and weighing equipment for the trough and the animal, the possibility is additionally offered of being in the position to supply rations that are performance-oriented and adapted to the nutritional requirements of the individual. Apart from precise individual rationing this plays a role in reducing environmental pollution through reduction of excrement in quantity and in critical contents.

Trial method

In a feeding trial performance-oriented feeding adapted to individual nutritional requirements of feeding pigs carried out with feeding station was compared with conventional multi-phase feeding with trough. Individual animal feeding (EF) and group feeding (GF) was carried out with two trial groups, each of 20 animals, in separate pens. In one pen the EF group were fed via feeding station. The GF group animals were kept in two longitudinal-trough pens each of 10 animals.

The pelleted feed for both groups was based on the components barley, wheat and soya extraction meal. The energy content of the initial mix lay between 13.8 and 13.2 MJ ME. With the EF group, two mixes were used, one with a crude protein content of 19.3% and the other 11.8%. The daily rations of the individual animals were adjusted to the actual liveweight of the animals and comprised appropriate amounts of the above contents. At every visit to the feeding station the animals were weighed and the weight recorded. The amount of feed actually consumed was calculated from the difference of trough weight before and after feeding for each individual animal and totalled over each day. Should feed be left over in the trough, the resultant weight was then carried over and calculated with the feed intake of the following pig in the station.

GF feeding took place twice daily. Four mixes were used with crude protein contents of 18.5%, 16.2%, 14.0% and 12.8%. This rationing applied to the liveweight periods 30 to 50 kg, >50 to 70 kg, >70 to 90 kg and >90 kg. All animals had free access to drinking water via nipple drinkers sited away from the feeding area.

Results

In feeding performance there were significant differences between the two trial groups (*table 1*). Against expectations, the animals in the EF group developed significantly worse than the conventionally fed animals. In the observed feeding period of 83 days their

Table 1: Fattening results of the two trial groups with single animal feeding (EF) via feeding station and group feeding (GF) via trough

	Individual feeding (EF)				Group feeding (GF)			
	x	Min	Max	VK (%)	x	Min	Max	VK (%)
Beginning weight (kg)	42	35	51	9	42	35	49	9
End weight (kg)	96	93	110	4	104	86	123	9
Growth (kg)	54	41	64	10	62	49	82	11
Daily l.weight gain (g)	660	463	722	10	745	590	883	11
Feed conversion 1:	3,2	2,6	4,6	14	3,3	-	-	-
Feed call-up (%)	92	74	118	12	100	-	-	-

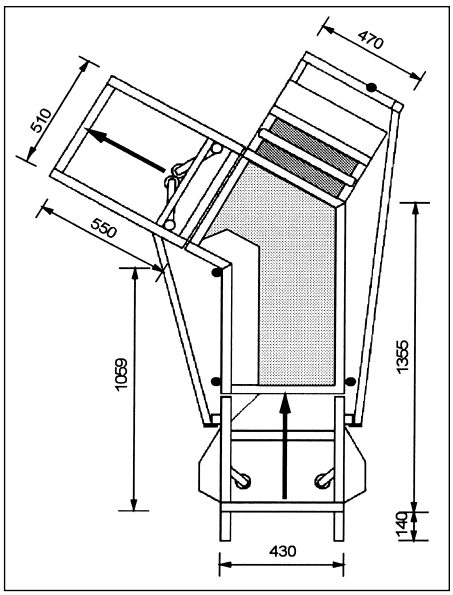

Fig. 1: Feeding station

achieved weight gain was 8 kg less. This represented a difference of 9 percentage points between groups to the detriment of the animals with EF. With the EF pigs the end weight lower than that of the GF animals. However, the development of the EF pigs appeared to be a little more homogenous which was reflected in a notably smaller coefficient of variation. With a feed conversion ratio of 1:3.3 the GF animals appeared to perform somewhat worse than the EF ones which averaged 1:3.2 This observation was relevated, however, when one took account of the fact that in the process of development, weight gain increasingly involves more fat deposition and this leads to a reduction in the degree of energy intake efficiency. Based on the different development intensity of the two groups, it was to be expected that the feed conversion efficiency of the EF group would reach the same value as the animals reached the same liveweight. The difference between the two groups could be explained through the incomplete feed call-up by the EF animals. Where no feed was left in the trough by pigs, the animals were calling-up on average only 92% of their feed requirements during the entire feeding period. There were, however, great individual differences hereby.

Discussion

These results were at first surprising. Similar trends were, however, noted in pre-trial observations and have also been mentioned in the literature. A systematic investigation of this observation has not yet been undertaken so that, in this case, only a few suppositions can be put forward. Because of the limited capacity of their digestion tracts feeding pigs, unlike sows, cannot consume their entire daily ration in a single feed. Thus a feeding pig requires several feeding visits in a day with a total feeding time of from around 60 to 80 minutes. In addition to this there are two to five visits to the feeding station without feed being called-up because the station is already occupied. In the supply of feed for 20 animals and a running time of 24 hours per day the feeding station is, on paper, utilised 100%. Pigs are, however, day-active and have well-developed rest periods and stimulate one another in their activities. Thus, especially during the night, there occurs longer phases when the station is seldom visited. From this it can be assumed that the animals do not technically have the time to call-up their entire daily ration and cannot compensate for this through changing feeding behaviour with, e.g., greater speed of feeding or larger amounts of feed. In that this effect of reduced feed intake can be observed even in smaller groups, it also appears to offer an animal-based explanation in this case. The feeding one after the other through the feeding station does not relate to the natural behaviour of pigs which, in the herd, animate one another to action, especially with regard to feeding. Competition that occurs through this appears not to have such a negative effect as does the suppression of appetites through social isolation.

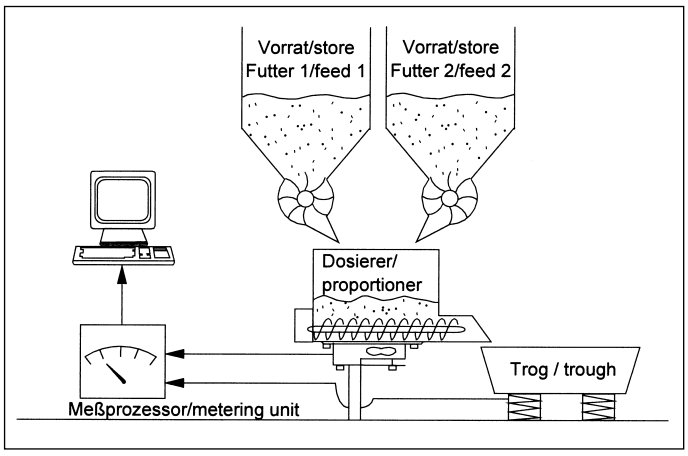

Fig. 2: Metering unit consisting of two storage vessels, one intermediate proportioning container and trough with weighing equipment

Conclusion

A closed feeding station with demand-based feed rationing and supply technology is an interesting option for the accurate meeting of requirements. However, a wider use of this technique under slaughterpig production conditions is not realistic in the foreseeable future because it means that the adaptation ability of animal behaviour required is taken to its limits and that this is reflected in performance depression. It would appear more sensible not to adapt the animal to the technology, but instead to match the technical procedure to the requirements of the animal.

Literature

[1] *Klußmann, H.-W.*: Einzeltierfütterung von in Gruppen gehaltenen Mastschweinen. LANDTECHNIK 50 (1995), H. 5, S. 290 – 291