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Plastic tunnel housing for feeding pigs

Technical evaluation of a tunnel with 400 feeding pigs

In the last years limited returns from slaughter pigs has led to the establishment of low investment pig housing. In plastic tunnel housing erected in 1998 pigs are kept on deep straw bedding in two pens each for 200 head and separated by feeding places. In the feeding period from ~35 to ~115 kg lw, dlwg (summer) was 798g to 860g (winter). Labour input was 0.81 man hours/feeding pig. Investment was DM 278/pig place including the plastic costs (DM 78/pig place). Limited investment needs had to be judged against increased management requirement.

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Keywords

Feeding pig system, naturally ventilated housing, plastic tunnel housing, deep litter

Encouraged by the use of plastic tunnels for pigs in Canada and Australia [1, 2] a plastic tunnel house for 400 feeding pigs was erected in 1998 by the Barnstädt agricultural enterprise with the aim of creating feeding places with less investment cost. The investigations were aimed at providing information on the suitability during winter and summer of the building and on the management requirements. Final results are to serve as decision aids with regard to further investments.

Housing concept and management

The plastic tunnel housing was erected adjacent to a piglet rearing facility and managed in conjunction with this.

Figure 1 shows its plan elevation. Compartments 1 and 2 are identical and arranged symmetrically. Between the compartments is a non-roofed inspection and movement passage, used for moving the pigs out of the building. The tunnel consists of 3-ply light plastic sheeting (plastic – aluminium foil – plastic) spanned over a metal frame and anchored with cables. The frame rests on wooden sleepers. The gable ends are fitted with doors involving the raising of the plastic sheeting. The gap between door lintel and curved roof remains open so that moist air can escape (*fig. 2*). When temperatures are high a fan positioned over the inspection passage helps move the air. With 200 places per compartment, each animal has 0.85 m^2 deep litter area and 0.30 m^2 movement space in the feeding area. Animal/feeding place ratio is 12:1. The wet mash feeding automatics are positioned alongside one another in two rows. In addition to the drinkers in the feed troughs, a further five nipple drinkers are freely available for water supply. The feed for the piglets and the feeding pigs is produced in meal form by the enterprise. In the first two to three weeks the feeding pigs get piglet-rearing feed before being changed over to feeding rations. Bedding is every second or third day with big square straw bales. After the pigs are moved out of the house, the compartments are dunged, cleaned and disinfected. The pit under the slatted flooring of the feeding area is cleaned out once in winter and two to three times in summer.

The 400 castrated pigs are housed at liveweights of 33 to 37 kg and stay until slaughter at around 115 kg lw. Because of different growth rates within batches, pigs are shipped off three to five times during the feeding period.

Trial method

In three trial periods, beginning 14.12.1998, 22.3.1999 and 14.7.2000 data was recorded for system evaluation of plastic tunnel housing as part of a diploma thesis. Total feed, water, bedding and energy consumption was recorded daily and investments and feed prices taken from the company records. Labour input was calculated according to the advanced time measurement method. Additio-

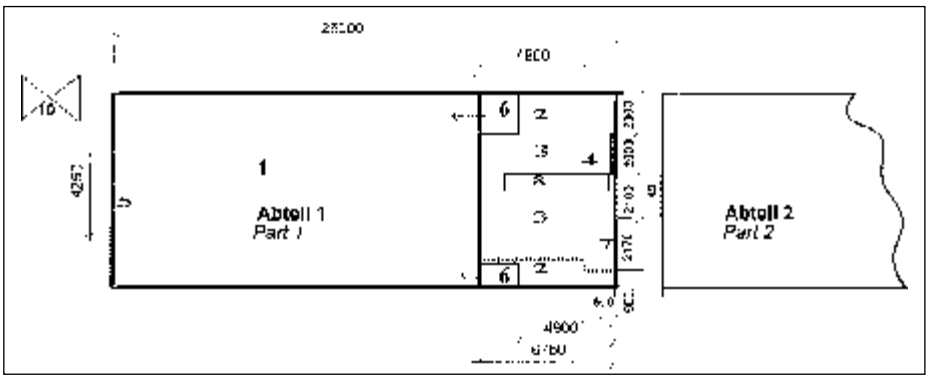

Fig. 1: Plan elevation of plastic tunnel housing: 1 laying area with deep litter, 2 Cemented area, 3 Fully slatted flooring, 4 Drinkers, 5 Door, 6 Steps, 7 Pen doors, 8 Feed automatic, 9 Inspection passage, 10 Feed silo

nally, information on the development of temperatures and relative air moisture was added. The plastic tunnel was visually inspected for wear damage. In the first and third trial period individual pig weighing took place at housing and departure for slaughter. Veterinary treatments and deaths were documented.

Results

The interior temperatures of the plastic tunnel housing were only marginally above those outside. The tunnel had to have continuous throughflow of air because otherwise, especially during low temperature periods, condensation formed on the sides. The lowest measured temperature was -13.5°C, the highest 34°C. With high temperatures, the pigs moved onto the slatted flooring and tried to cool themselves with water out of the drinkers. In *table 1* are given feeding performances, as well as material and financial inputs for management of the plastic tunnel housing. With 741 g dlwg in the third trial period (the first trial period was at the same time production start) satisfactory dlwg performance was achieved in the plastic tunnels. Losses ran from 1.8 to 3%, representing average figures for feeding pig enterprises. The high feed consumption in the first period was due to mistakes in the management of the feed automatics. On the other hand, very good feed performances were achieved in the third trial period. The pigs were healthy. Problems emerged only in wet-cold weather and where air exchange was too low. This led to pneumonia.

Labour input was very high at 0.81 man hours/feeding pig. From this, 45% represented time taken in selecting slaughter-ready pigs out of the large groups. Differing growth rates meant this occurred from three to five times per feeding cycle. The investment totalled DM 278/feeding place including DM 78/pig for the plastic tunnel and thus was very much less than the usual costs for outside climate housing. Manufacturer's guarantee for the plastic is 10 years with no wear being noticed over the past three years.

Fig. 2: View of plastic tunnel house (Photo: Koch)

Summary

The following conclusions, may be drawn concerning the construction and management of a plastic tunnel pighouse with deep litter:

- Slaughterpigs can be produced in this housing. Erection of the housing cladding is simple. Requirements for successful production are enough straw, a permanent throughflow of air and careful animal observation. The results were no worse than those from other straw-bedded housing systems.
- The tunnel should be built in-line with the prevailing wind so that it can be well aired. The plastic must be firmly stretched over the frame. An additional fan is not then necessary. The possibility of an air cooling system is, however, to be urgently recommended.
- Especially in summer the pigs require free access to water. High water losses can take place with nipple drinkers. Drinking bowls are better.
- The 200-head large group requires careful daily animal inspection.
- Plastic tunnel investment is very low and the system is therefore suitable for starting-off in feeding pig production. The high management input required, however, speaks against its general application.

In total it can be said: the plastic tunnel housing is suitable for the feeding of pigs in large groups on deep straw bedding. Problems include high temperatures, as in other similarly bedded naturally ventilated housing. It remains to be seen how long the plastic can really last.

Table 1: Investment and production-costs in tunnelshelters

Cost type	Consumption	Batch 1	DM/feeding pig Batch 3	DM/pig and year (3.3 cycles/y)
Variable costs (without animal costs)				
Feed	2.94 kg/kg growth			
	27.47 DM/dt	73.93	63.41	209.24
Water	10.5 l/pig and day			
	3 DM/m³	2.80	3.10	10.21
Electricity	0.14 DM/kWh	0.41	0.39	0.84
Bedding	0.58 kg/pig and day			
	60 kg; 65 kg			
	8.00 DM/dt	4.80	5.20	17.16
Total variable costs		**81.94**	**72.10**	**237.93**
Fixed costs				
Labour input	Man hours/ slaughterpig	0.81	0.82	2.71
	DM 23/manhour	18.63	18.86	62.24
Investment	DM/pig place			278.00
Depreciation	10% of DM 148	4.78	4.78	15.80
Building	2% of DM 130	0.79	0.79	2.60
Others		0.60	0.60	2.00
Total fixed costs		**24.80**	**25.03**	**82.64**
Total costs		**106.59**	**96.99**	**320.57**

Literature

[1] *Maltman, J.*: Managing hoop structures for maximum profitability. Beratungsunterlage, Manitoba, 1998

[2] *Payne, H.*: Growth market for shelters. Pig International, 29 (1999), no. 2, pp. 29 – 32