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Improving feeding pig margins with the sorting and weighing gate

Nowadays there's been enough experience and trials in the management of feeding pigs in large groups with sorting and weighing gate for this approach to have proved itself profitable in practice. The approach continues to have supporters as well as critics. A comprehensive compilation of available information concerning and its evaluation in farm management terms is published in the booklet "Mastschweinhaltung mit Sortierschleuse" (Feeding pig management with sorting and weighing gate) by a KTBL Working Group. This article shows how a housing concept involving sorting and weighing gate, stocking levels in pens and precise sorting based on market requirements can improve margins.

Keywords
Feeding pig management, large groups, sorting and weighing gate, late-finisher feeding, feeding pig cycles, slaughter weight

Abstract
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With the aim of compiling experiences on the application of a sorting gate and associated planning recommendations, a KTBL working group with experts from advisory organisations and research was grounded in November 2008 [1]. The authors of the report presented here are members of this working group, the target of which was the production of a publication with the focal point an evaluation in terms of farm management economics of feeding pig production in large groups with sorting gate compared with small groups and with conventional large group production. Basis for the comparison of different housing concepts was the adaptation of a housing model from KTBL building costs and production valuations from the KTBL databank "Betriebsplanung Landwirtschaft" (Management Planning Agriculture) 2010/11 [2]. Additionally included were the results of investigations by the North Rhine-Westphalia Chamber of Agriculture into investment requirement for differing housing systems and into the extent of differences in sorting results in commercial farming [3].

Housing concepts and pen stocking procedures towards improving exploitation of available space

Quite apart from the housing system applied, feeding cycles per year in many units lie markedly under the value that might be expected from the weight gain performance achieved. Towards the end of the feeding cycle, pens are not completely empty because the poorer performing feeders still substantially under optimum slaughterweight have to be fed further.

Where penning is in small groups, and with large groups of 40 to 50, regrouping these late-finishers into a special compartment has not proved successful. Reasons for this are extra labour input and fighting between the mixed groups of pigs with the resultant performance penalties.

On the other hand, large groups with a sorting gate to filter out the poorer performers offer attractive conditions for improvement of feeding cycles per year and housing space exploitation. The additional labour required for sorting is small and mainly consists of management input. Additionally, animals from a large group can be re-penned into smaller groups without problem.

Through a housing concept with regrouping of the animals in grower/preliminary feeder, finisher-feeder and late-feeder compartments, the number of feeding cycles per year can be markedly increased while effectively lengthening the feeding period for the stragglers, the late-feeders.

Investigated with three housing concepts and pen-stocking approaches applied in practical pig production were results in terms of space requirement per feeding place, available feeding period, number of feeding cycles per year and exploitation of housing area. The research was based on a model with four large group pens and around 1500 feeding pig places (**table 1**):

- Housing concept I – No regrouping in the feeding period. Late-feeders remaining in the large group. (Reference system.)
- Housing concept II – No regrouping in feeding period. Late-feeders in small groups.
- Housing concept III– Filtering-out (sorting gate) of slower growers from preliminary feeders and final feeders. Late-feeders in small groups.

Table 1

The effects on pig performance figures of different housing concepts and pen occupation systems for feeding from 30 to 120 kg in large groups with sorting and weighing gate

Kennwert *Parameter*	**Einheit** *Unit*	**Stallkonzept und Buchtenbelegungsverfahren** *Housing concept and pen occupation system*		
		Mast ohne Umgruppieren, Nachmast – Großgruppe *Feeding without changing pens, late-finishers – large group*	**Mast ohne Umgruppieren, Nachmast – Kleingruppen** *Feeding without changing pens, late-finishers – small groups*	**Vor- und Endmast[1], Nachmast – Kleingruppen** *Growers and finishers[1], late-feeders – small groups*
Stallkonzept/*Housing concept*		**I**	**II**	**III**
Abteilfläche[2] je Mastplatz *Compartment floor area[2] per feeding place*	m²	0,77	0,78	0,78
Bestand je Stall, davon *Numbers per house, of which*	TP	1528	1618	1486[3]
Vormast/*Growers*	TP			3 • 472[3]
Endmast/*Finishers*	TP	4 • 382	4 • 382	3 • 382
Nachmast/*Late-finishers*	TP		1 • 90	3 • 90
Verfügbare Mastzeit, davon *Available feeding period, of which*	d	134	140	145
Vor-/Endmast/*Growers/Finishers*	d	118	115	115
Vormast/*Growers*	d			30
Endmast/*Finishers*	d			85
Nachmast/*Late-finishers*	d	16	25	30
Mindesttageszunahme[4] für das Endmastgewicht *Minimum daily live weight gain[4] for finisher target end weight*	g	672	643	621
Mastdurchgänge (DG) je Mastplatz und Jahr *Feeding pig cycles (DG) per feeding place and year*	Anzahl/cycles	2,63	3,04	3,04
Stallplatzausnutzung[5] *Housing space occupancy*	Tier/(m² • a) *Animal/(m² • a)*	3,42	3,90	3,90

TP = Tierplatz/*pig place*; d = Tage/*days*; DG = Durchgänge/*cycles*; a = Jahr/*year*

[1] Vor- und Endmast mit Aussortieren langsamwüchsiger Tiere/*grower and finisher feeding periods with slower-growing pigs removed.*

[2] Die Abteilfläche je Mastplatz umfasst die Innenfläche im Abteil, einschließlich des Abteilgangs, als Maß für den Stallflächenbedarf.
*The compartment floor area per feeding place refers to the compartment interior area including the compartment passageways as measurement of the h*ousing area requirement.

[3] Für die Vormast werden die Mastabteile für 30 Tage mit je 90 Tieren höher belegt. Das ergibt anteilig 70 zusätzliche Mastplätze für den Stall: 3 • 90 Vormastplätze • (30 d • 3,04 DG/365 d) = 70 TP. Insgesamt errechnen sich 3 • 382 Mastplätze + 3 • 90 Nachmastplätze + 70 Mastplätze aus der Vormast = 1486 Mastplätze.
For the grower feeding period the feeding compartments were stocked with 90 pigs more over a 30-day period. This resulted proportionately in 70 extra feeding places for the house: 3 • 90 grower places x (30 d • 3.04 DG/365 d) = 70 TP. In total 3 • 382 feeding places + 3 • 90 late-finisher places + 70 feeding places from the growers = 1 486 feeding places.

[4] Alle Tiere mit mindestens der angegebenen täglichen Zunahme erreichen das Mastendgewicht bis zum Ende der Mastzeit mit Nachmast. Die durchschnittliche tägliche Zunahme der Mastgruppe beträgt in allen Stallkonzept 763 g bei 118 Masttagen.
All animals with at least the given daily liveweight gain achieved, with late-finisher feeding, the feeding end-weight within the given feeding period. The average daily liveweight gain of the feeding group in all the housing concepts was 763 g with 118 days feeding.

[5] Stallplatzausnutzung = Mastdurchgänge je Mastplatz und Jahr/Abteilfläche je Mastplatz.
Housing space occupancy = Feeding cycle per feeding place and year/compartment floor area per feeding place.

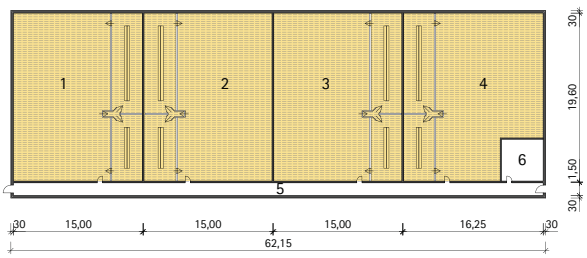
Housing concept I – Feeding period without regrouping. Late-feeders remain in large group

All animals were housed in a single compartment, remaining there until the end of the feeding period (**figure 1**). End weight was reached after 118 days with a daily weight gain of at least 763 g. Late-feeders remained a further 16 days in the pen with a weight gain of at least 672 g per day to reach the required end weight. However, feeding the late-feeders prevented timely re-stocking of the large group pen (**figure 2**) and, with that, only 2.63 feeding cycles per feeding place and year were possible.

Housing concept II – Feeding period without regrouping. Late-feeders re-penned in small groups

The large group system was complemented in this case by re-penning the late-feeders in small groups (**figure 3**). For four large group compartments all that was required was a late-feeder compartment with 90 places. The large group compartments were already emptied after 115 feeding days by which time 80% of the animals had reached the desired end weight. The number of feeding cycles per year increased to 3.04. The underweight animals were housed for 140 feeding days including late-feeding in the smaller compartment (**figure 4**), sufficient for a daily weight gain of at least 643 g.

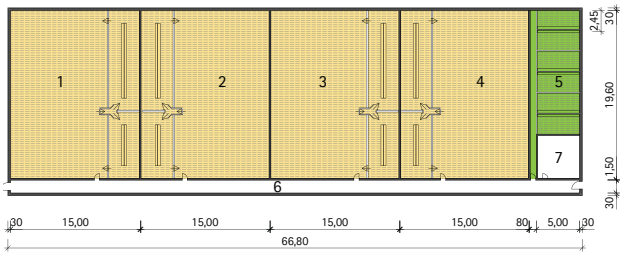
Abb. 1



1-4 Großgruppenabteil (382 Mastplätze)/*large group compartment (382 feeding pig places)*
5 Treibgang/*pig moving passage*
6 Nebenräume/*auxiliary rooms*

Pig house with 1528 feeding places with four feeding pig compartments and without compartment for late-finishers (Drawing: KTBL)

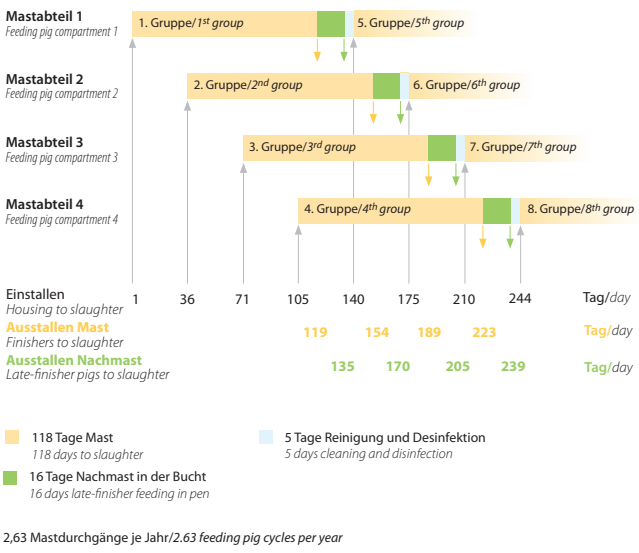
Abb. 3



1-4 Großgruppenabteil (382 Mastplätze)/*large group compartment (382 feeding pig places)*
5 Kleingruppenabteil (90 Nachmastplätze, 15 Plätze je Bucht)
Compartment with pens for small groups (90 places for late-finishers, 15 pig places per pen)
6 Treibgang/*pig moving passage*
7 Nebenräume/*auxiliary rooms*

Pig house with 1 618 feeding pig places with four feeding compartments and one compartment with pens for late-finishers (Drawing: KTBL)

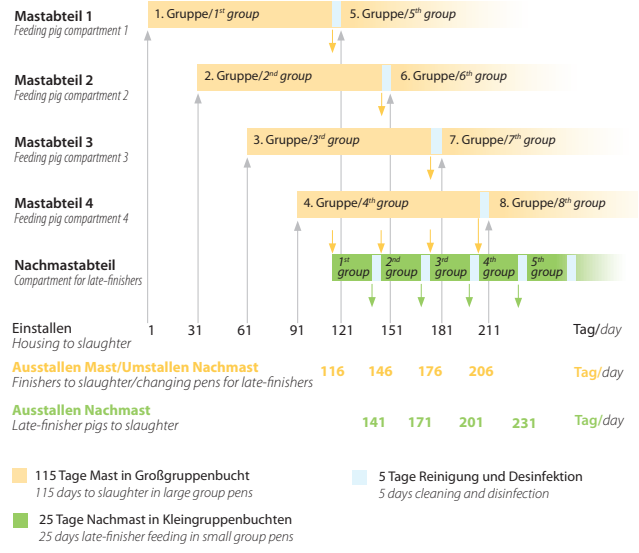
Abb. 2



2,63 Mastdurchgänge je Jahr/*2.63 feeding pig cycles per year*

Pen occupation plan for pig house with four feeding compartments for finishing without changing pens; late-finishing in the large group pens (Drawing: KTBL)

Abb. 4



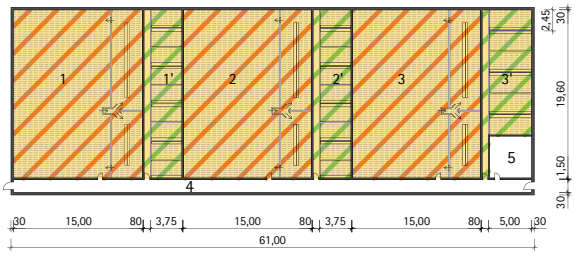
3,04 Mastdurchgänge je Jahr/*3.04 feeding pig cycles per year*

Pen occupation plan for pig house with four feeding compartments and a late-finisher compartment with small groups (Drawing: KTBL)

Housing concept III – Sorting slower growers from the preliminary-feeders and final-phase feeders for further feeding in small groups

Initially, the large group compartments were stocked higher for a preliminary-feeder phase with a total 90 animals (**figure 5**). On the thirtieth day the 90 lightest animals, each with a weight of around 48 kg, were regrouped in a separate small group compartment (**figure 6**). The large group compartment with the faster-growing animals was cleared after 115 days. The slower-growing animals had 145 days available. If the animals gained at least 621 g per day in weight they reached the optimum end weight in this time.

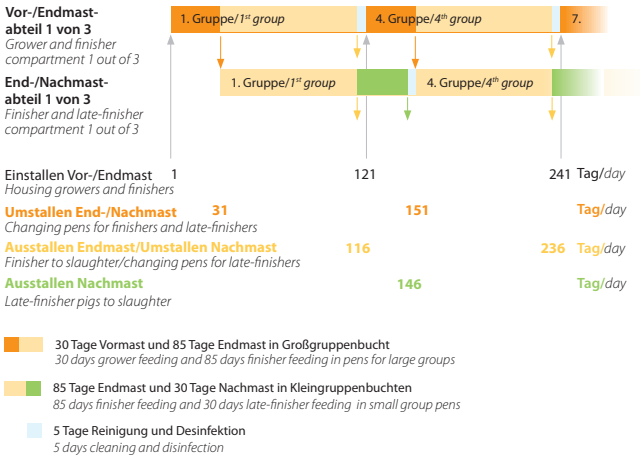
Fig. 5



1-3 Großgruppenabteil (472 Vormastplätze, 382 Endmastplätze)
Large group compartment (472 grower places, 382 finisher places)
1'-3' Kleingruppenabteil (90 Endmast-/Nachmastplätze; 15 Plätze je Bucht)
Compartment with pens for small groups (90 places for finishers/late-finishers, 15 pig places per pen)
4 Treibgang/*pig moving passage*
5 Nebenräume/*auxiliary rooms*

Pig house with 1486 feeding pig places with three large-group compartments for growers and finishers and three small-group compartments for finishers and late-finishers (Drawing: KTBL)

Fig. 6



Pen occupation plan for pig house with three grower and finisher compartments as well as three finisher and late-finisher compartments for re-grouping. Slower-growing animals following the grower period can be re-grouped in a finisher and late-finisher compartment (Drawing: KTBL)

Effects of the housing concepts and the pen stocking systems

Through the creation of grower/preliminary-feeder and late-feeder feeding places the number of feeding cycles per year and the feeding place exploitation increase significantly. In this context the most meaningful parameter is "weight gain per feeding place and year". Taken account of here is the difference in feeding cycle throughput time in the individual feeding phases and the resultant different weight gains because of the feeding days available to the animals in the individual feeding phases (**table 2**). The annual weight gain per square metre of compartment floor for the housing concept with sorting gate used with preliminary-feeder and late-feeder is around 27–32 kg higher than the comparative values without preliminary-feeder and final-phase feeders. This means an increase of from 10–12%. The annual increase in margin per feeding place is 4.90 to 5.50 € on the basis of gross margin without taking into account the costs for the additional labour and housing investment. The financial success of the lengthened feeding period for late-feeders is, however, strongly dependant on the prices for feed and bought-in piglets and the slaughter prices. This means the overall effect here can only be tendencially evaluated.

Sorting differences in marketing with large reduction potential

Decisive for the margin is the slaughter company's evaluation of slaughterweight and carcass quality, deviations from the optimum criteria being reflected in reduced income. In practice, such variations in sorting can mean around 4 € per feeding pig, even in well-managed units, according to marketing analyses (**table 3**) [3]. Thereby, the differences between the upper and the lower 25 % show that farms with below average performance could still gain around 3 € per animal. If the sorting gate is used to improve delivery results by even half, the annual additional margin per large group with 382 feeding places would be 1,480 € (2.63 feeding cycles, housing concept I) to 1,720 (3.04 feeding cycles, housing concept III). For units already achieving average sorting results, a margin potential of 0.64 € per feeding pig would be possible which would still bring around 640 to 730 € per large group.

Conclusions

Housing pigs in large groups with a sorting gate can achieve significant margin advantages compared with housing in small groups and in conventional large groups. A concept that, e.g., plans the filtering of late-feeders into small groups can, through improved housing area exploitation, increase feeding cycles per year from 2.63 to 3.04 and improve margin per feeding place and year by 4.90 €. Where differences in sorting results can be reduced, margin advantages of 4.50 € per feeding place and year are realisable. In total, margin advantages of 9.40 € can be achieved. The model calculations are based on gross margins and present the margin potential. Differences in the required

Table 2

Annual growth and additional income with differing housing concepts and pen occupation systems with large groups and sorting and weighing gates. Comparison of housing concept II and III with housing concept I

Betriebswirtschaftlicher Kennwert *Farm management parameter*	**Einheit** *Unit*	**Stallkonzept und Buchtenbelegungsverfahren/*housing concept and pen occupation system***		
		Mast ohne Umgruppieren, Nachmast – Großgruppe *Feeding without changing pens, late-finisher pigs – large group*	**Mast ohne Umgruppieren, Nachmast – Kleingruppe** *Feeding without changing pens, late-finishers – small groups*	**Vor- und Endmast[1], Nachmast – Kleingruppe** *Grower and finisher feeders[1], late-feeders – small groups*
Stallkonzept/*Housing concept*		**I**	**II**	**III**
Zuwachs[2] je Mastplatz und Jahr *Weight gain[2] per feeding place and year*	kg	235,6	260,0	263,2
Zuwachssteigerung/*Weight gain increase*	kg		27,4	31,6
Mehrerlös[3] je Mastplatz und Jahr *Increased income[3] per feeding place and year*	€		4,9	5,5

[1] Vor- und Endmast mit Aussortieren langsamwüchsiger Tiere/*grower and finisher feeders with slower-growing pigs removed.*
[2] Durchschnittliche tägliche Zunahme 763 g bei 80 % der Gruppe: 90 kg Zuwachs in 118 Tagen. Durchschnittliche tägliche Zunahme 660 g bei 20 % der Gruppe: Zuwachs 88,4 kg (Verf. I), 92,4 kg (Verf. II) und 94 kg (Verf. III) in 134 bis 145 Tagen (Tab. 1)/*average daily liveweight gain 763 g for 80 % of group: 90 kg weight gain in 118 days. Average daily liveweight gain 660 g for 20 % of group: weight gain 88.4 kg (system I), 92.4 kg (system II) and 94 kg (system III) in 134 to 145 days (table 1).*
[3] Direktkostenfreie Leistung 0,20 €/kg Zuwachs/*inputs free of direct costs 0.20 €/kg weight gain.*

Table 3

INFOSYS-enterprise comparison "AutoFOM[1]-graded differences" of a Westphalia slaughterhouse from October to December 2009 [3]

Merkmal *Parameter*	**Einheit** *Unit*	**Gesamt** *Total*	**Obere 25 %** *Top 25 %*	**Untere 25 %** *Bottom 25 %*	**Differenz (obere - untere)** *Difference (top - bottom)*
Anzahl Betriebe/*No. of enterprises*	Stück *farms*	1964	490	491	
Anzahl der ausgewerteten Tiere (Ø)/*No. graded pigs (Ø)*	Tiere *pigs*	480	508	384	124
Schlachtgewicht/*Slaughter weight*	kg	95,5	94,3	97,0	-2,7
Indexpunkte[2] je kg Schlachtgewicht/*Index points[2] per kg slaughter weight*	Punkte *points*	0,977	0,994	0,956	0,038
Sortierdifferenz (Verlustpunkte je Tier)/*Sorting difference (point losses per animal)*	Punkte *points*	-3,76	-2,84	-4,95	-2,11
Kalkulatorischer Verlust je Tier[3]/*Calculated loss per animal[3]*	€	-5,26	-3,98	-6,93	-2,95

[1] AutoFOM ist eine vollautomatische Klassifizierung der Schlachtkörper im Schlachtbetrieb mit Ultraschall. Dabei wird das Gewicht der wertbestimmenden Teilstückgewichte wie Schinken, Lachs und Bauch einbezogen/*autoFOM is a fully automatic carcass classification system in slaughterhouses using ultrasonic measurements. In calculation this takes into account the weights of value-influencing joints such as hams, loin or belly.*
[2] Indexpunkte: Das Gewicht der wertvollen Teilstücke und das Schlachtgewicht werden nach Gewichtsgrenzen mit Punkten bewertet und ergeben Indexpunkte je Tier. Die Indexpunkte je kg Schlachtgewicht sind der alle Bewertungsfaktoren berücksichtigende Vergleichswert für die Sortiergenauigkeit/*index points: The weight of the valuable joints and the slaughterweight are, within weight limits, evaluated via a points system, giving index points per animal. The index points per kg slaughterweight represent the comparison values for the sorting precision taking account of all evaluating factors.*
[3] 1,40 € je Indexpunkt/*1.40 € per index point.*

investment per feeding place and in labour input have still to be considered. The economic success of the sorting gate is therefore to a great extent influenced by the efficiency of housing space exploitation and a technology standard for the sorting gate that allows a very uniform standard of selection.

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