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Investment requirements of stables for heifers and fattening cattle

In buildings for livestock a large amount of capital is tied up for a long time. It is therefore important to match all important criteria like housing system, stocking size, working time requirement and just the investment requirement. As a decisive support to such cases the online tool “Baukost” developed from the KTBL contains models of different stables with the respective investment requirement for comparison. Results of new stables for heifers and fattening cattle will be presented.

Keywords
Cattle, stable construction, investment requirements

Abstract
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When selecting the housing models, the objective was to show the widest possible spectrum of currently practised forms of husbandry [1; 2]. The following specifications were made to ensure that the effects of individual criteria remain recognisable and the models comparable: shallow foundation with foundation slab, load-bearing structure in solid timber, exterior walls with wooden boarding or windbreaker nets, and roofing with corrugated fibre cement panels.

Heifer husbandry

Three different husbandry methods were selected for the heifers (**Table 1**). For the cubicle stalls, variants with three rows and with cubicles arranged in comb form, as well as a housing unit with litter system and a variant conforming to the Commission Regulation (EC) No. 889/2008 with outdoor run.

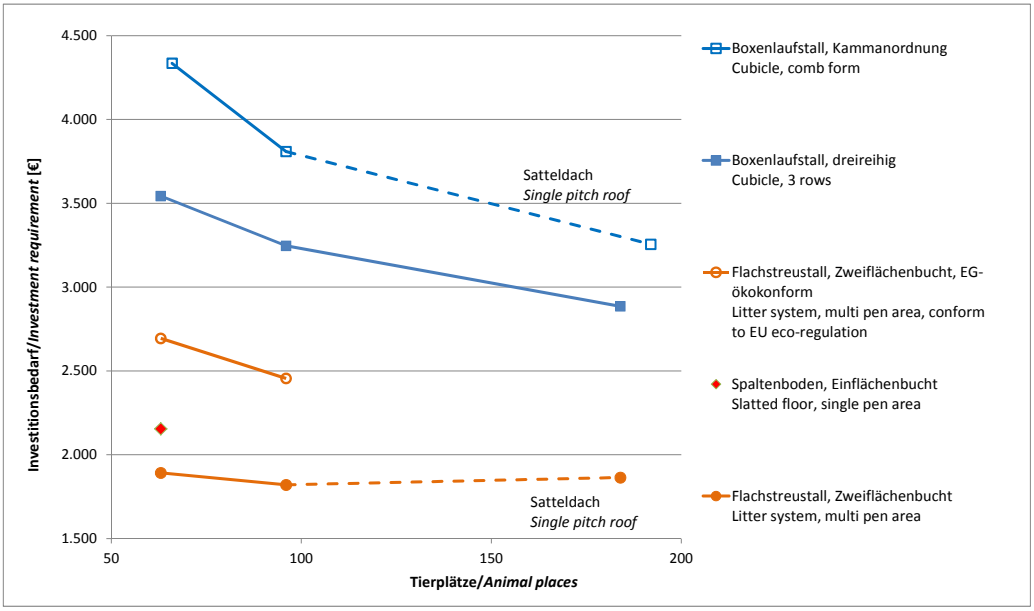
Table 1

Criteria of the checked stable models for heifers

Haltungsverfahren *Housing system*	**Entmistung** *Manure removal*	**Konstruktion** *Construction*	**Tierplätze** *Animal places*	**Buchten** *Pens*	**Plätze/Bucht** *Places/pen*	**Investitionsbedarf [€/Tierplatz]** *Investment requirements [€/animal place]*
Boxenlaufstall, dreireihig *Cubicles, 3 rows*	Zirkulationssystem *circulation system*	Pultdach *single pitch roof*	63	3	21	3.543
			96	4	24	3.247
			184	4	46	2.885
Boxenlaufstall, Kammanordnung *Cubicles, comb form*	Zirkulationssystem *circulation system*	Pultdach *single pitch roof*	66	3	26/22/18[1)]	4.335
			96	4	30/26/22/18[1)]	3.808
		Satteldach *double pitch roof*	192	4	60/52/44/36[1)]	3.255
Spaltenbodenstall, Einflächenbucht *Slatted floor, single pen area*	Zirkulationssystem *circulation system*	Pultdach *single pitch roof*	63	3	21	2.155
Flachstreustall, Zweiflächenbucht *Litter system, multi pen area*	mobil *mobile*	Pultdach *single pitch roof*	63	3	21	1.892
			96	4	24	1.821
		Satteldach *double pitch roof*	184	4	46	1.864
Flachstreustall, Zweiflächenbucht mit Auslauf, EG-ökokonform *Litter system, multi pen area, outdoor run, conform to Commission regulation (EC)* No. 889/2008	mobil *mobile*	Pultdach *single pitch roof*	63	3	21	2.694
			96	4	24	2.455

[1)] Unterschiedliche Gruppengrößen/*different group sizes.*

Fig. 1



Investment requirements for heifers in € per animal place, construction with single pitch roof (unless otherwise noted)

The models are available in up to three herd sizes, from around 63 to about 190 animal places. Housing is planned from month 7 to month 27 in three and four groups respectively.

In the case of cubicles arranged in comb form and in housing with a conventional litter system, the models for the large herd with 192 and 184 places respectively have a two-row layout with a double pitch roof. All the other models are single-row arrangements covered with a single pitch roof.

All the models have a manure store with sufficient storage capacity for six months. The feed store, on the other hand, is not taken into account in the calculation as it is largely independent of the process.

Results

The investment needs for the models examined cover a relatively large price range from € 1,830 to € 4,350 per animal place (**Figure 1**).

It is striking that the economies of scale resulting from herd sizes is low as of 100 animal places and more and the litter system in conventional husbandry even becomes a little more expensive per animal place. However, it should be noted here that the models connected by dashed lines in **Figure 1** have different roof forms and are therefore not directly comparable. The double pitch roof for the two-row arrangement has a larger volume and is thus relatively more expensive than the single-pitch roof design.

The impacts of the husbandry method have a greater effect than the differences due to herd size. These differences are essentially due to the different area requirements. In a conventional litter system and slatted floor housing, each animal has about 6 m² available, while in the cubicle housing system they have about 8 to 9 m² available, and in organic litter systems even over 11 m² each.

Furthermore, in the litterless systems the slurry storage space beneath the housing is expensive, and the cubicle systems have a feeding table that is completely covered, while in the other single-pitch housing models it is only partly covered.

Fattening cattle

For fattening cattle, the housing models set out in **Table 2** were selected for data processing.

The animals are housed at weights of approx. 200 to 720 kg and they are transferred to new places once when they have achieved a weight of around 450 kg. In the slatted floor models each animal has approx. 2.8 m² available in the preliminary fattening period, and approx. 3.37 m² in the finishing period. In the litter system, the areas available are 3.5 and 4.5 m² respectively, and in the organic variants 4.0 and 5.0 m² plus outdoor run. The animals are driven to the new places via an outdoor passageway, and in the housing models conforming to the Commission's Organic Regulation via the outdoor run.

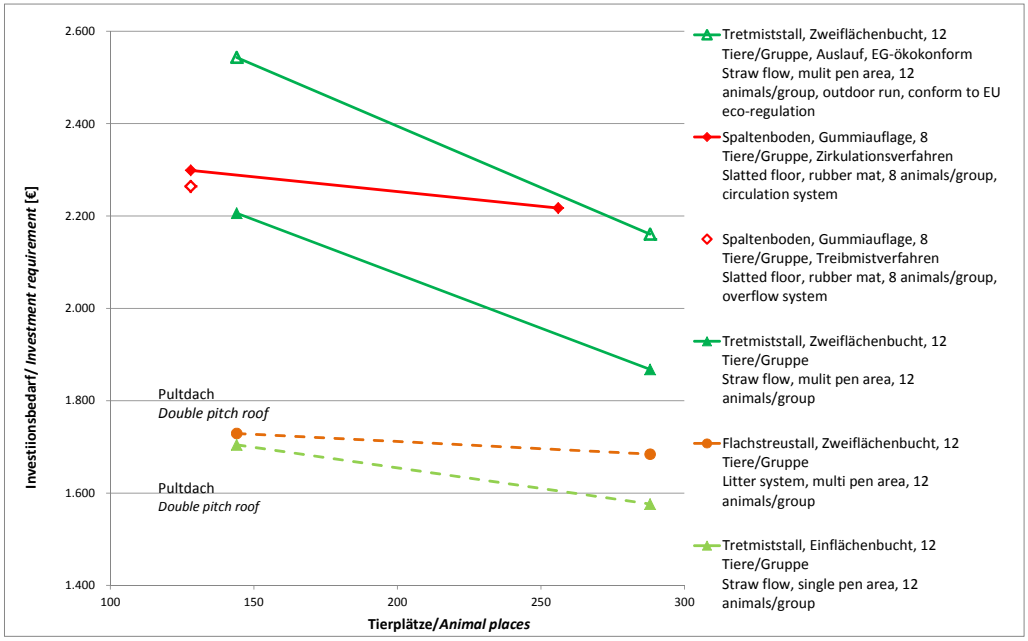
A manure store with a storage capacity of six months is included in the cost determination for all models, but the feeding store is left out of consideration.

Results

The investment requirement for the models examined is shown in Euros per animal place in **Figure 2**. The range extends from below € 1,600 to over € 2,500 (price status 2011).

In addition to the process criteria stated, however, the models also partly differentiate in structure and equipment, so that investments are not comparable in all cases. Despite this, some conclusions can be drawn.

Fig. 2



Investment requirements for fattening cattle in € per animal place, construction with double pitch roof (unless otherwise noted)

Among the conventional husbandry methods, slatted floor housing systems require the greatest investment. This is balanced by distinctly lower work outlay, but that was not the subject of this investigation.

Doubling the herd size leads to economies of scale for all models, but the extent varies substantially. Whereas in the case of slatted floor housing with slurry pits the increase in herd size only accounts for savings of about 4 %, in the case of straw flow housing with multi-pen area economies are as high as around 18 %.

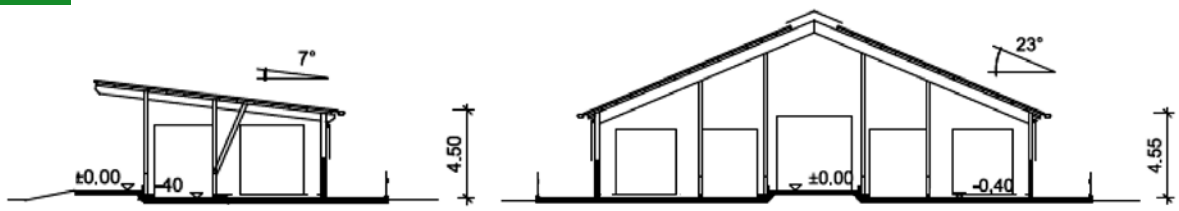
In litter system with single-pen area, the herd sizes can only be compared to a limited extent. Here the small housing

Table 2

Criteria of the checked stable models for fattening cattle

Haltungsverfahren ***Housing system***	**Entmistung** ***Manure removal***	**Konstruktion** ***Construction***	**Tierplätze** ***Animal places***	**Plätze/Bucht** ***Places/pen***	**Investitionsbedarf [€/Tierplatz]** ***Investment requirements [€/animal place]***
Spaltenbodenstall *Slatted floor*	Treibmist *overflow channel*	Satteldach *double pitch roof*	128	8	2.264
Spaltenbodenstall *Slatted floor*	Zirkulationssystem *circulation system*	Satteldach *double pitch roof*	128	8	2.299
			256		2.217
Flachstreustall, Zweiflächenbucht *Litter system, multi pen area*	mobil *mobile*	Pultdach *single pitch roof*	144	12	1.729
		Satteldach *double pitch roof*	288		1.684
Tretmiststall, Einflächenbucht *Straw flow, single pen area*	mobil *mobile*	Pultdach *single pitch roof*	144	12	1.704
		Satteldach *double pitch roof*	288		1.576
Tretmiststall, Zweiflächenbucht *Straw flow, multi pen area*	mobil *mobile*	Satteldach *double pitch roof*	144	12	2.206
			288		1.868
Tretmiststall, Zweiflächenbucht mit Auslauf, EG-ökokonform *Straw flow, multi pen area with outdoor run, conform to Commission regulation (EC)* No. 889/2008	mobil *mobile*	Satteldach *double pitch roof*	144	12	2.543
			288		2.161

Fig. 3



Litter system, sectional drawings: one row assembly with single pitch roof (left) and two row assembly with double pitch roof (right)

systems each have a simple single-pitch roof structure with lower construction volume instead of a double-pitch roof with ventilation ridge (**Figure 3**) as in the larger systems, which greatly reduces the economies of scale.

The difference between the manure removal systems in the litterless models is insignificant. The overflow system at a cost of € 35 per animal place requires somewhat lower investment than the circulation system. However, the comparison is only possible for 128 places. It is to be expected that the difference will increase for larger housing systems, as outdoor slurry storage space can be constructed more cheaply than slurry pits in the housing.

For the straw flow system with multi-pen area, variants complying with the EC Organic Regulation were examined. The greater space requirements in the housing and the outdoor run lead to extra costs of approx. 15 % or around € 300/animal place.

Finally, if one compares a currently calculated model (e.g. slatted floor housing with circulation system) with a corresponding system from the last study on investment requirements for fattening cattle in the year 2000, a cost increase of around 27 % can be noted. This is due not only to the general increase in construction prices of around 22 %, but also to better equipment, such as for instance the rubber matting on the slatted floors.

Conclusions

The investment requirements for 23 housing models for fattening cattle and heifers with different husbandry methods, herd sizes and construction designs were determined – with partly distinct differences in price. Fundamentally it can be established that

- larger housing units by comparison with smaller units,
- husbandry methods with a low area per animal,
- litter systems without expensive slurry channels, and
- simple designs with low volume such as single-pitch roofs

display lower investment requirements.

However, for a comparison of methods it is necessary to take into account not only the investment requirements, but also further key aspects such as working time requirement and animal welfare. These aspects were not the subject of this study. Drawings, construction specifications and the investment requirement at element level for all models examined can be investigated in the fee-based online application “Baukost” [3].

Literature

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