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Future-oriented livestock buildings outwith built-up areas

For every investment-willing farmer there remains the question of the appropriate site and the optimum planning of a new steading. Which methods can be used to identify the correct site? What kind of legal safeguards are there? And in what way must the future-oriented building be designed? The results of this year's federal "Farm building" contest reflect these questions and show exemplary solutions.

Fig. 1: The sow multiplication unit Pommerehne convinced through a high hygiene standard

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Keywords

Federal"Farm building" competition, pig production, dairy cattle production, greenfield sites

Individual farms, wooded surroundings, hamlets – for ages these have been favoured locations for the siting of a farm. Alongside the development of the villages there were, under certain political conditions (heritage rights, population growth), repeated attempts to site farms outwith existing villages in order to simplify the work (short journeys to fields). The privileges extended to agricultural building in non built-up areas still remain. According to § 35 Par. 1 No. 1 of the building statute book (BauGB) a planned building in a so-called "outer area" or greenbelt area is permissible when it serves an agricultural or forestry enterprise, only occupies a minor portion of farmland, is not against the interests or concerns of the general public, and if sufficient mains connections are on hand.

In the translation of this law nowadays there is often conflict with other interest groups such as, e.g., communities with leisure areas, or Nature protectionists. Society reacts very sensitively because aspects which have to be protected such as soil, water, air and the natural variety of species are endangered through further settlements in the countryside and the sealing-off of ground surfaces often involved. Additionally, the public is becoming increasingly aware of the importance of Nature and the countryside for recreation. In principle, the countryside outside already built-up areas should be kept free of every building, and the emergence of new "splinter communities" prevented.

Thus for a long time efforts have concentrated in keeping farm buildings in the villages. While in the 80s the federal farm building contest features exemplary buildings for cattle and pigs within communities, nowadays most villages have no more suitable sites for modern farm units. Buildings for competitive sizes of livestock units require complexes that pass within the residential village picture neither functionally nor aesthetically.

The change in the village population and the growth of farm sizes lead to conflicts with users of facilities in the village and its periphery. The greatest conflict potential lies with the effects of emissions. Despite the fact that a privileged position is given to agriculture and its development possibilities in village areas (VA) according to the Agricultural Building Use Regulations, in practice the advantages involved are applied increasingly seldom because the character of the VA regions has gradually changed from the former agricultural character.

Fig. 2: Exterior feed troughs such as here on the Gaidetzka unit enable a compact design even with large herds

The acute need for suitable locations for farms capable of further development cannot be overlooked.

Contest prizewinners

Nominated for a prize have been the following farms:

- Claudia and Helmut Bäumler in 89177 Ballendorf, Baden-Württemberg; expanding of a hamlet with around 112 dairy cow places
- Gaidetzka GbR in 19073 Walsmühlen, Mecklenberg-Vorpommern; farm relocation in greenfield site with around 322 dairy cow places
- Gerhard Hölz in 72818 Trochtelfingen, Baden-Württemberg; part-relocation in greenfield site with around 600 feeding pig places
- Erwin and Peter Meutes in 54597 Rommersheim, Rheinland-Pfalz; expansion of a part relocation on greenfield site with around 115 dairy cow places
- Pommerehne GbR in 17179 Klein Lunow, Mecklenburg-Vorpommern; complete relocation to greenfield site with around 250 sows and 960 gilt places
- Peter and Detlef Staffel in 35282 Rauschenberg-Josbach, Hessen; complete relocation to greenfield site with around 237 dairy cow places

Livestock buildings

The aim of planning is the integration within a yard or closed steading complex of all individual farm components such as farmhouse, livestock buildings, feed and manure storage, transport ways and hygiene facilities. The working areas, with the associated noise and dirt pollution they can produce, should be separated from the clean and quieter living area.

All aspects of the farm buildings or steading must be capable of extension, at the same time and/or independently from one another. Because of this, the location must be sufficiently-large. Additionally, a suitable amount of specialist understanding and foresight is required for the establishment of buildings and auxiliary facilities with the right relationship to one another and to their surroundings, and without creating obstacles for future development. The location for manure storage is a recurring problem. Alongside technical requirements such as fall and distance from livestock buildings, there is a series of other aspects to attend to. Will the emitted odour lie over the farm or, even worse, over the farmhouse? Is the manure container in the way of possible further building? Is it possible to expand its capacity? Is a clean and simple transport of the manure from the container possible? Generally applicable answers cannot be found for these questions. Every complex construction operation is unique and requires individual solutions.

Positioned in the centre of planning, in every case, must be a thought-through development programme for the area and the functions involved. The basis for this can only be created through a future-oriented farm management concept. Only those who include all foreseeable eventualities will be able to realise the expansion and development possibilities. For this reason, all the buildings and associated equipment that are expected to be required should be planned with the original concept, even when they are not to be realised until the medium term.

Pig production

Pig production is characterised by two leading thoughts: the retaining of optimum hygiene conditions and the realisation of further specialisation effects. In practice, this is reflected in growing herd size and in the constructional realisation of the Pig Production Hygiene Regulations – which also represent the interests of the farmer. These include, e.g., the rule that all doors into pig premises must be lockable, the construction of loading ramps, and a changing room with a "lock effect" so that entry into critical areas is only possible after changing clothes. This black and white principle is at the same time applied to all levels , e.g. on the farm, the livestock buildings and the building interiors (*fig. 1*).

In a sow enterprise, the use of crates in the farrowing and serving areas and loose housing in groups for dry sows are now standard procedure. In piglet production, group systems are becoming established and natural ventilation is gaining in importance. In feeding pig systems, too, larger groups are the trend, whereby, especially with larger units, purely natural ventilation will play no great role. First trends indicate the acceptance of a mixed system with buildings which can be forced ventilated as well as aired naturally.With sows and piglets, and feeding pigs too, strawless systems remain standard.

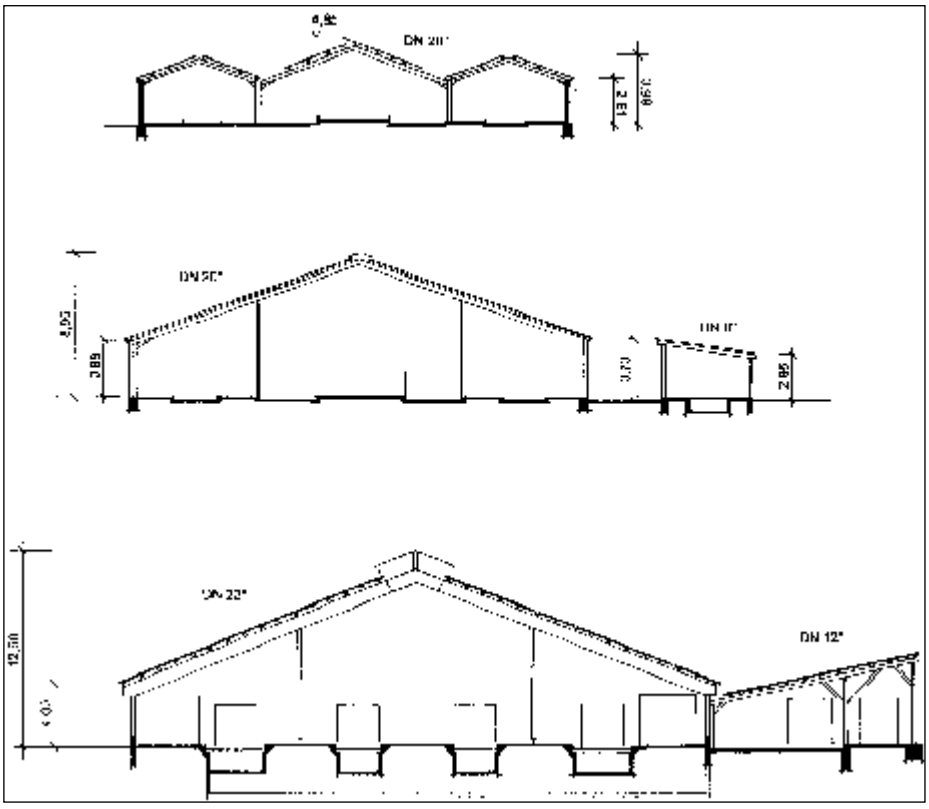

Fig. 3: Multi-nave building for dairy cattle is characterised by low gables – above: Bäumler farm (112 places); middle: Meutes farm (115 places); under: Gaidetzka farm (322 places).

Dairy cow production

The proportion of dairy herds with more than 100 cows increases steadily. Livestock complexes consisting of only one building which also includes the milking area, a design which has proved practical for herds of up to 120 cows, are losing out in importance. With bigger herds, especially those with more than 200 cows, it is advisable to site the parlour, milk storage and other connected facilities in a separate building.

As before, cubicle houses are standard. The positioning of the cubicles can vary according to size of herd, feeding and milking system, from two plus two rows or four rows, with big herds in some cases having six rows (*fig. 2*). The movement areas can be solid floored with scraper, or feature slats over slurry channels.

Complicated technical elements should be avoided in the construction of the buildings. Simple steel or timber constructions with uninsulated walls of wood, or with spaceboarding and windbreak netting, have become established. Naturally-ventilated buildings require high eaves sides and have a large interior volume. This leads to high gables which are often problematical from an aesthetic aspect. It's easier for low-profile housing to be integrated into natural surroundings. This effect can be achieved through multi-nave building design (*fig 3*). To secure the minimum required air exchange, the sides of such housing should be kept open if possible, open roof ridges and interior yards support the ventilation. Protection from extreme weather conditions can be achieved through windbreak nets or closeable curtains and transparent panels.

As in the past, it is fundamental that the dairy cows should be offered as good an interior climate as possible and plenty of daylight. The open design of such buildings meets these requirements. Additionally freemovement yards for the cows offer good possibilities of meeting their natural needs. In good designs, this movement yard can also

Fig. 4: The movement yard has proved practical on the Meutes farm – the dung scraper is also used as cow driver

be used as the pre-parlour gathering area (*fig. 4*). Even when there are often pastures near the farm around the settlement area, it is becoming increasingly common (mainly to cut back in labour requirements) to avoid pasturing systems.

Alongside the basic economical calculations, production with a view to animal welfare requirements becomes more important. This makes itself felt in multiple details such as the increasing comfort of lying surfaces. The measurements of the laying areas are still often insufficient, as are the size and design of parlour waiting areas.

The costs involved, according to figures from the award winning dairy farms in the federal contest depend on herd size and building characteristics and run from 6,700 to 9,000DM/cow place, on the main around 7,000 DM/cow place.

Location

The contest has shown that the planning and building permission procedure with the community has, as a rule, proceeded without any problems and is completed within a few months when the selection of the location has been carefully prepared. For the location decision, year-long preparations are required. The testing of various possible locations with the help of those who represent public interest has established itself as a way of finding the optimum variant.

In the choice of location the fundamentals for sustainable building and farming are laid according to the following:

- Economy – cost-saving through connection to existing mains services, building site acquirement through exchange of land
- Ecology – plan no dramatic attack on the site's natural aspects. Instead, the buildings should merge into the location, sealing-off of soil surfaces should be reduced as much as possible
- Socio-economy – retain the family home in the middle of the village, ensure optimum working economy with part relocation of the livestock buildings in greenfield site, work in cooperation

As far as pig production is concerned building outside the village has great importance on hygiene and pollution protection grounds.

With large buildings for cattle housing the space requirements on the farm site outside the village are most important, with large-volume livestock buildings, accompanying room for feed storage and transport equipment. Also to be considered is the noise pollution.

Influential factors in choice of site

There are many factors to consider when choosing a building site. Taken individually, these have different weightings.

The farmer should make a check list with the following factors:

- Development target for the farm business
- The continuous planning procedure in the surrounding infrastructure (e.g. road building), final decisions for architectural plans, regional planning targets
- Distance between livestock buildings and other users and to protection areas, sensitivity of the surroundings
- Important highlights in surrounding landscape (e.g. tree groups, church)
- Distance to connection points for traffic, water, sewage and energy supply
- Topographic and climatic influences such as steep slopes, type of ground on the site, hydrologic conditions, prevailing winds, potential frost, fog and wind dangers
- Spacial requirements for the whole steading with buildings and additional facilities, farmwork and traffic surfaces with future development intentions
- Positioning of farmhouse in relation to the livestock housing

Instruments for locating site

Should no own land be available as building site, the site can be got, e.g., through land exchange as part of an official farm structure redesign programme (German: Flurbereinigung). Especially suitable here nowadays is the so-called agri-structure development plans (German: Agrarstrukturelle Entwicklungsplanungen) which allows a building site to be agreed upon with the local authority with first talks on an informal basis.

The farmers on the prize-winning enterprises had informed themselves early-on over the planning procedure in their regions – in some cases they took part in area development planning discussions. At the beginning, there are talks with the representatives of the community concerned, the advisers from the agricultural ministry, and representatives of the farmers union. In addition there are informal discussions over alternative sites within the family and with advisers. Then a meeting on-site should allow community opinion leaders and public representatives to meet and finally decide about location. Timely involvement of the general public in the decision-making process and ensuring public support for the right site has proved very important, especially for pig enterprises. Using the press and other publicity media to put the farmers' point of view in such developments can lead to agreement with general public, who often are uninformed about such developments, over the positive aspects of any development, and play a part in avoiding delays in the planning permission phase.

Form of settlement

Building outwith community areas requires resource-saving forms of settlement and construction. Full relocation appears at first the elegant solution. But on cost grounds is not always optimal. In the end, the form of settlement chosen depends on the starting conditions for each case. It depends, too, especially on the historical settlement development and the personal constellations of

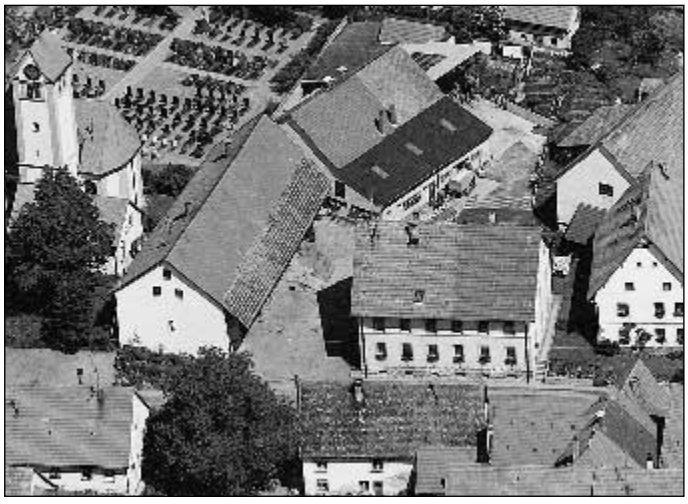

Fig. 5: Alongside the church, the home of the Hölz family. In the old farm buildings only the farrowing area has been extended

Fig. 6: Merging with the landscape through association with a group of trees – the Hölz farm

Fig. 7: The Staffel farm's positioning – on a gentle slope with a woodland background – enriches the landscape

the farmer and his family. The prize-winning farms demonstrated typical settlement forms:

Full relocation Peter and Detlef Staffel GbR.
The old farm in a cramped village site with pollution-sensitive neighbourhood developed from 1974 with 20 cows to 83 cows in1983 and then later to 237 cows. Only a relocation to a greenfield site 5 km from the village could allow erection of new buildings for 237 cows. The full relocation with two new farmhouses reflects the characters of these capable farmer families which did not want to separate living and working.

Part relocation Erwin and Peter Meutes
The family farmed from buildings in the middle of the village since the 18th century. In 1973 the first part-relocation took place out to the village periphery which was a decisive step towards a gradual increase in herd size. In the third development stage a cubicle house with 110 dairy cow places was built. All the old buildings continue to be used, some of them for rearing followers. Because of the social links to the village and the love of the old farmstead the three generation family follows the motto: "Living in the village and working outside it".

Farm enterprise relocation Gerhard Hölz GbR
The fully-enclosed pig enterprise could not be developed further in the old steading in the village as there was conflict in the neighbourhood over smell and noise pollution associated with this. Together with the farmland restructuring officials a site was found 800 m from the village outside the built-up area. Two community machinery sheds were already on-site. The enterprise relocation consists of feedhouse, two naturally ventilated buildings for 600 feeding pigs, 450 growers and 112 dry sows. In the old steading the farrowing facility was modernised. The beautiful old farmhouse continues to be used by the family – a full relocation is considered likely, but some time away in the future (*fig. 5*).

Integration in the landscape

Those who want to make changes in the sensitive areas of undeveloped countryside have the duty to be careful that these changes fit-in with the surrounding landscape. This has been achieved by the contest winners. Taking the Hölz farm as an example, this is nestled in a valley by a group of large old trees with sight of the village. The skilful grouping of the buildings acts as an enrichment of the landscape (*fig. 6*).

The Bäumler farm on the Swabian Alb chose a low construction form for the new steading. The livestock building merges with the landscape and complements the hamlet.

The Staffel farm used the woodland background and the siting of the grouped buildings and two farmhouses on a slope to merge everything well with the landscape. Supporting the good appearance is the choice of timber construction (*fig. 7*)

In every case, the choice of site took place under aspects of care of the countryside and with the involvement of the Nature protection officials. These sort of decisions were not made simply round the table, but instead through walking the area with those involved and thus being able to experience the attributes and otherwise of the potential sites.

The farmers themselves are interested in integration with the landscape.They involve themselves with the characteristics of the natural biosphere and its history. Finally, they worked with advisers, planners and architects, all of whom were responsible for carefully placing the new buildings in the landscape. In the finding of the building site, its planning, its integration into the surrounding landscape, nature protection officials acted as partners in the process – not as opponents.

All constructions in the greenbelt outside communities represent an attack on the surrounding nature. According to the law, therefore, those that build are duty-bound to make compensation. The type and extend of such compensation is decided upon by the authorities as a part of the official building permission. Here, one's attention is drawn to the differing regulations of the various authorities. Especially positive on the part of the contest participants was the high measure of voluntary participation on their part. In the main this is applied to the compensatory measures regarding tree and hedge planting, which only have their effect after a few years following planting. The costs of such measures move in the four-figure region and are met by the farmers concerned. Against total building investments they are hardly noticeable, especially as much of the work involved is done with own-labour and because the compensatory tasks are in the interest often of the farmers themselves, e.g. as sight or wind breaks. The prize-winning farms are also, however, examples of the tradition of individual farmsteads or hamlets fitting into the landscape so that optically as well as functionally they serve the public interest in enrichment, and care of, the countryside.

Pictures: 1, 4 Achilles; 2 Gaidetzka; 3 KTBL; 5, 6 Hölz; 7 Staffel

Further information

KTBL Paper 397 "Future-oriented livestock buildings outwith built-up areas" includes a comprehensive treatment of the subject's planning instruments, site location, planning of steading, production systems. Issued at EuroTier 2000
100 pages, 36 DM, ISBN 3-7843-2122-4
(Order-Nr. 11397)

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