Control of production in animal husbandry

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INSTITUUT
VOOR LANDBOUWTECHNIEK EN RATIONALISATIE

Introduction

Livestock increase as part of work simplification also means that the income from labour will more depend on the results of livestock farming. Those farmers who know how to produce at the relatively lowest costs, will have the highest income. In view of this we also must pay attention to the quality of the product, though actually this is often not sufficiently rewarded.

If we want to produce at reasonable costs, it is essential that we should constantly have a good survey of the production process and deepen our insight. This can hardly be realized in practice if no periodical production and cost control system is applied.

ILR-Cow-calender. (Z.J. Halman)

The calender is designed in such a way that by recording the number or the name of the cow on the date of insemination at the same time the data are known on which

- the cow has to be controlled on heat (Three weeks after insemination)
- the milking of the cow has to be ended (seven months after impregnation)
- the calving can begin (nine months after impregnation)
- the cow has to be controlled on heat in connection with the following insemination

For the control on heat after insemination it was necessary to add a second calender to the proper one.

With a view to the length of the production-cycle a combined use of the calender of the current year and the one of the previous year is necessary.

ILR Sow-calender (Z.J. Halman)

For pig farming a calender similar to the cow-calender was designed recently.

KOE-KALENDER

AFKRUISEN	oktober	november	december	januari	februari	maart	april	mei	juni	juli	augustus	september
	augustus	september	oktober	november	december	januari	februari	maart	april	mei	juni	juli
	januari	februari	maart	april	mei	juni	juli	augustus	september	oktober	november	december
KONTROLE												
22	1	1	1	1	1	1	1	1	1	1	1	1
23	2	2	2	2	2	2	2	2	2	2	2	2
24	3	3	3	3	3	3	3	3	3	3	3	3
25	4	4	4	4	4	4	4	4	4	4	4	4
26	5	5	5	5	5	5	5	5	5	5	5	5
27	6	6	6	6	6	6	6	6	6	6	6	6
28	7	7	7	7	7	7	7	7	7	7	7	7
29	8	8	8	8	8	8	8	8	8	8	8	8
30	9	9	9	9	9	9	9	9	9	9	9	9
31	10	10	10	10	10	10	10	10	10	10	10	10
1	11	11	11	11	11	11	11	11	11	11	11	11
2	12	12	12	12	12	12	12	12	12	12	12	12
3	13	13	13	13	13	13	13	13	13	13	13	13
4	14	14	14	14	14	14	14	14	14	14	14	14
5	15	15	15	15	15	15	15	15	15	15	15	15
6	16	16	16	16	16	16	16	16	16	16	16	16
7	17	17	17	17	17	17	17	17	17	17	17	17
8	18	18	18	18	18	18	18	18	18	18	18	18
9	19	19	19	19	19	19	19	19	19	19	19	19
10	20	20	20	20	20	20	20	20	20	20	20	20
11	21	21	21	21	21	21	21	21	21	21	21	21
12	22	22	22	22	22	22	22	22	22	22	22	22
13	23	23	23	23	23	23	23	23	23	23	23	23
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16	26	26	26	26	26	26	26	26	26	26	26	26
17	27	27	27	27	27	27	27	27	27	27	27	27
18	28	28	28	28	28	28	28	28	28	28	28	28
19	29		29	29	29	29	29	29	29	29	29	29
20	30		30	30	30	30	30	30	30	30	30	30
21	31		31		31		31			31		31

Control method for grassland exploitation

Every year again the dairy farmer is confronted with the task of a good grassland exploitation. During the grazing period there must always be sufficient meadow grass of good quality. Moreover the same grassland area should provide the planned quantity of roughage with the desired nutritive value for winter feeding.
The grown quantity of grass in kg cannot be determined exactly in the field. About this quantity the following data are known:
- the area on which the quantity is grown.
- the length of time in which the quantity is grown.
The livestock consumes p.e. the grass of 10% of the area under grass in one week. If the growing period of this grass is 20 days, 10% of 20 or two "growing days" a week would be needed for grazing. A quantity which is on a average grown in two days on the area is consumed as grass.
If the growing rate of the grass had been lower, then for instance 15% of the area under grass with an average growing period of 20 days had been needed for grazing in that week. The consumption for grazing was then 15% of 20 is three "growing days" a week.
The number of growing days needed for grazing a week is a measure for the growing rate of the grass. In a week the grass grows during seven days. The remaining growing days are a yardstick for the size of roughage production. This principle is the base of a method for adapting roughage production to the growing rate of the grass. An exemple is given in fig. 1.

Lit.: Heijde. P.B.A. van der, Het afstemmen van de wintervoerwinning op de grasgroei. IIR rapport. 1972.

Example

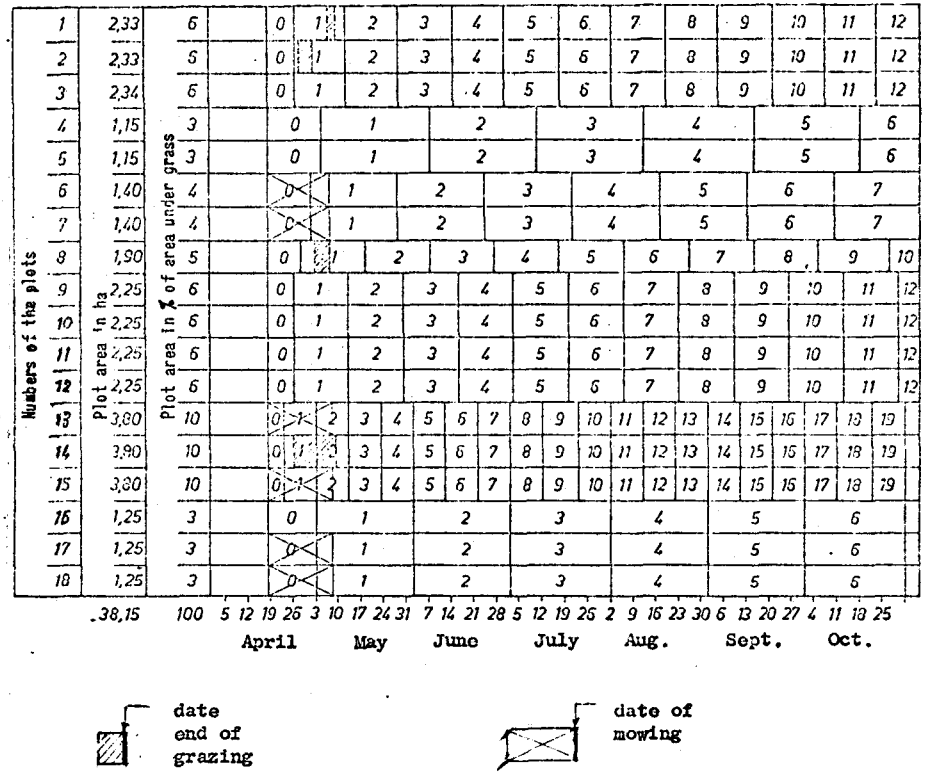


Fig.1 A diagram for planning the grassland exploitation of a farm with 18 plots under grass.

Table 1. Survey of supply and consumption (for grazing and roughage production) till May 10 and the planning till May 17.

Comparison till Saturday	Supply in "growing" days"	Consumption in "growing days" total	roughage production	grazing	Weekly increase of consumption for grazing in growing days
May 3	6	2	-	2	-
May 10	13	13	8	5	3
May 17	20	20	12	8	3

Egg production control

The farmer should, in principle, daily control the number of eggs gathered as well as the feed consumption of every set of layers. How this daily control can be performed most easily is a subject of study. Apart from this, there should be a more thorough, weekly control.

From the data noted down for every set of layers, we can calculate the egg-laying capacity, the culls, egg-weight and feed consumption. By representing these results in graphs, we get a good survey of the trend of production and of feed conversion.

Properly speaking, the egg producer should, at the start of the laying period already, consider what he wants to achieve, in other words, he will have to form an accurate idea of the normal trend of production. Aspects, such as housing, the type of layer etc., should also be considered. This will give him a yardstick to judge the results actually achieved. It would be recommendable to put down this yardstick - this standard of judgement - on paper.

Figure 1 (a, b, c) gives an example of the trends drawn in the graphs with the ficed standard. It may further be observed that, at the end of the laying period, the periodical production control for the relative set of layers, closes with a total survey. This survey should cover the entire laying-period, including the time for cleaning and disinfection of the houses.

The calculation of the results can be entrusted to a service-centre. Due hereto the egg-producer can restrict his administration to record data. It also ensures an as rapid calculation of the results as possible. This is a first condition for good production control.

This service-centre is, in principle, in the position to draw attention to a less favourable trend of production. With sufficient participation, the data also can be used for improving the production standard accepted.

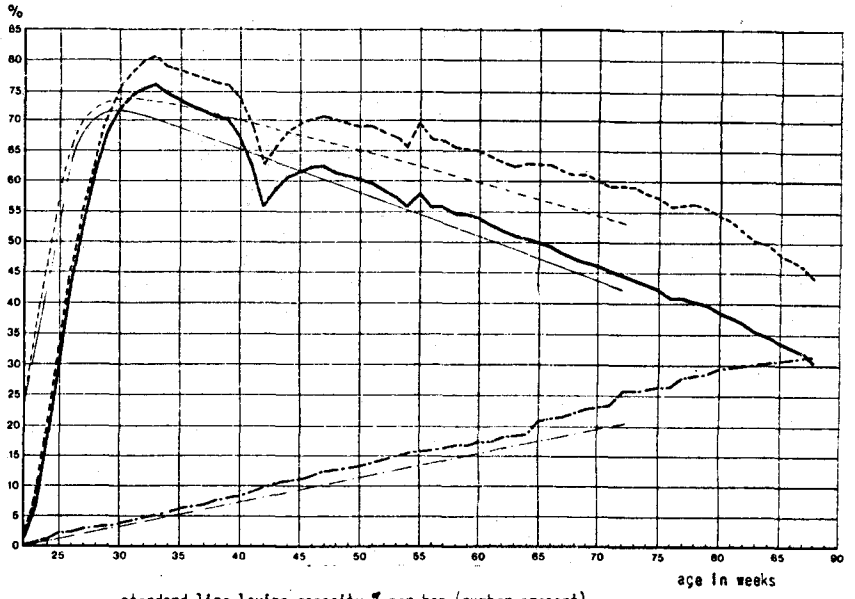


Fig. 1a Trend laying capacity and culls in %

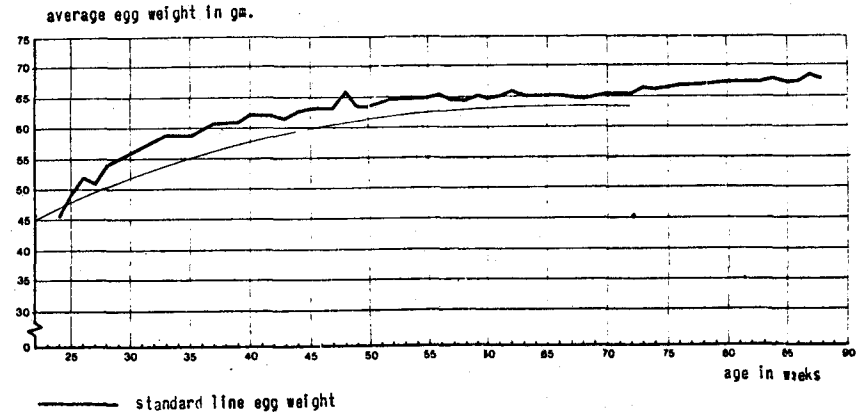


Fig. 1b Trend egg weight

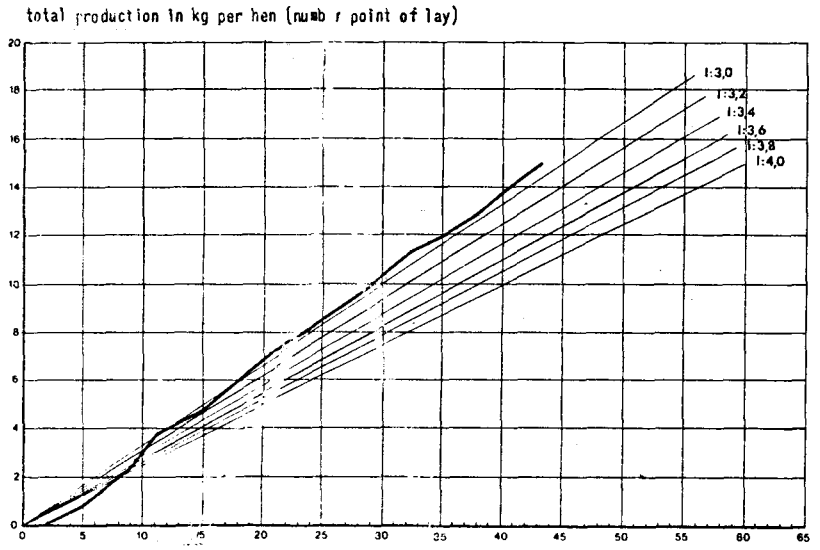


Fig. 1c Trend $\frac{\text{production}}{\text{feed consumption}}$

Current research

The intention is to design a system for production control in dairy-farming.
To day attention is paid to a method for the control of milk-production.

A new production method for pig farming?

1. Introduction

Pig herds on individual farms are growing progressively larger. It seems beyond doubt that the size of the stock on some farms requires the development of more appropriate production methods than those hitherto used. As a rule such a size increase will favour mechanization and automation, because investment per animal tends to become considerably lower. In using this opportunity close attention should, of course, be paid to the most labour intensive, everyday activities. But besides direct savings on labour, other aspects like warranties as to product quality and the effect of labour saving measures in the supplying and buying industries should also be taken into account.

2. Requirements which the production method should meet: -

The common objective of methods, as sought for, will be to produce pig meat in a way that creates a maximum difference between revenues and production costs. To achieve this goal the method applied should at least answer the following criteria.

- It should provide opportunities to raise the labour productivity

Apart from lowering the labour demand per animal and controlling the distribution of the daily labour demand within each period, improvement of the work quality deserves special attention. All necessary activities should be performed with adequate care and at the right moment. This applies particularly to the way the piglets are weaned. For instance, if growing pigs, weaned at four weeks, show a delay in growth of three days compared with those weaned at eight weeks, the first method is to be rejected. In our calculations the food conversion rates of piglets in both groups as well as the feed prices per kg were assumed to be equal.

- It should reduce production losses to a minimum

The method should suit the demands the pigs make on their environment. This applies to their accomodation, including the stall climate, as well as to the social relations among them. A considerate treatment can largely prevent the delays in growth that usually occur. In fact every delay in growth is a loss in production. In this respect changing pens and regrouping of piglets should be considered adverse measures, while due attention should be paid to the data of weaning (see Appendix I).

- It should offer ample opportunities to be adapted to the farmer's views

The production process shoul be controllable and adjustable to changing needs. This pertains especially to selecting - breeding included - and feeding, as the feeding cost accounts for over 50% of the total cost in pig production. Besides it is important that the farmer can control direction and pace of these adjustments himself.

- The production size should match the available labour force

Table 1 Lack of earnings due to production losses

Nature of production loss[1)]	Annual lack of earnings per farrow in Gld
Extension of dry period by 10 days	30.00
Extension of suckling period by 10 days	40.00
Loss of 1 piglet per farrow	90.00
Extension of growing period by 10 days	54.00
Feed consumption increase by 10% per kg growth	225.00
Slaughter quality decrease from price class 1 to 2	216.00

[1)] Assuming nine piglets are reared per farrow

An optimum labour performance will be achieved by sound preparations and sufficient checks. In view of the above estimates, special attention, for breeding, selection and preventive health care, will be remunerative. Investments and expenses for improving the living conditions seem also fully justified. Finally feeding should be done in the most effective way. (see Appendix II)

Literature: Heijde, P.B.A. van der, Guidelines in developing a new production method for pig farming. ILR report, may 1972.

Adverse measures in breeding and growing

Weaning of piglets

In principle early weaning reduces the cost price per piglet, as the partial cost for rearing and keeping the sow can be saved upon. On the other hand, early weaning may cause substantial delays in growth. This drawback may well outbalance the advantage, as can easily be demonstrated by the following example.

Suppose, a sow can, on the average, produce six litters of eight animals each by weaning at eight weeks. At a rearing cost of 250.- Gld per sow, thus 1/48 x 250 = 5.21 Gld is the cost at birth of each piglet. In this case the breeding cycle of a sow amounts to 4 + 112 + 56 = 172 days. With weaning at four weeks the breeding cycle of a sow would be 144 days. In comparing both cases we will assume the sows to become pregnant after first mating every time and to be taken out of production at the same age. In the second case each sow could, in theory, produce 172/144 x 6 = 7.2 litters or 7.2 x 8 = 57.6 piglets. So, for rearing the sow now only 1/57.6 x 250 = 4.34 Gld is the cost at birth of each piglet. Besides, in the first case, the sow needs 1.5-2 kg feed per day from week 4 to 8 of the suckling period to preserve its own health level. Thus, at a feed price of 0.40 Gld per kg the total cost per piglet is raised by $\frac{28 \times 2 \times 0.40}{8} = 2.80$ Gld.

The above implies that a positive balance of 5.21 - 4.34 + 2.80 = 3.67 Gld can be expected from weaning at four in stead of at eight weeks if we neglect all possible delays in growth. During its growing period a pig consumes, on the average, 2 kg feed per day. So, at a feed price of 0.40 Gld per kg, the total daily cost would average 2 x 0.40 x 100/60 = 1.33 Gld assuming the feed cost approximates 60% of the total growing cost. From this it appears that weaning at four weeks may already be considered an adverse measure if it would delay growth by only three days compared to weaning at eight weeks.

In our comparison, outside the fertility of the sows, the feed conversion rate of the piglets, as well as the feed price are assumed to be equal, whether weaned at four or at eight weeks. Despite these simplifications we feel able to take the following stand:

- The proper weaning date should be adjusted to the occasional needs of the piglets in order to prevent delays in growth. The same applies to the weaning method itself.

- Since all grown pigs should preferably be delivered once per unit it is highly desirable that they reach slaughter weight at the same date. As the piglets of a litter can vary in birth weight the occurring weight differences should be almost leveled during the suckling period.

Changing of growing pigs to new pens

Changing pens is only permitted if the new pen is empty and thoroughly cleaned and disinfected in advance. If properly done, also the feeding passage has to be cleaned. By changing pens savings can be made on the cost of housing. However, this advantage is at least partly counterbalanced by the extra labour required. To eliminate delays in growth the new pens have to be cleaned and disinfected very carefully. Consequently the effort involved will as a rule seriously unbalance the labour schedule. For this reason the measure seems unallowable if we want to raise the labour productivity and should be limited as much as possible.

Regrouping of growing pigs

Regrouping requires all or part of the animals involved to be changed to new pens. From a practical viewpoint cleaning and disinfecting of the pens are hardly feasible. Secondly its effectiveness is to be doubted because it brings animals into close contact that were hitherto strangers to each other. Thus, after regrouping, the available room has to be redistributed and socially a new order of precedence to be established among the animals in each pen. As a rule, this is developed through games of rough-and-tumble. While romping, a weaker animal should always have the opportunity to recognize the superiority of a stronger one, by its behaviour i.e. by flying from it. If pens are densely occupied the weaker animal cannot escape by flight. Consequently harmless romps will frequently end up in fighting, resulting in production losses due to deteriorated growth, death etc. So, arguments are in favour of lowering the density of a pen's population after regrouping. This, however, would detract much from the advantage originally aimed at viz. a reduced total cost per pig through a more efficient use of the stall's surface. Judging from our considerations the opposite might rather be the case.

Fluctuation of daily labour demand per litter of piglets

The schedules indicate the fluctuations in the labour demand per litter of piglets from the mating date of the sow to the final date the growing pen is cleaned and disinfected, following the delivery of the grown pigs, for three different cases.

Case A:

Breeding and growing are done at different farms or in separate stalls, both sows and piglets being moved to new pens recurrently.

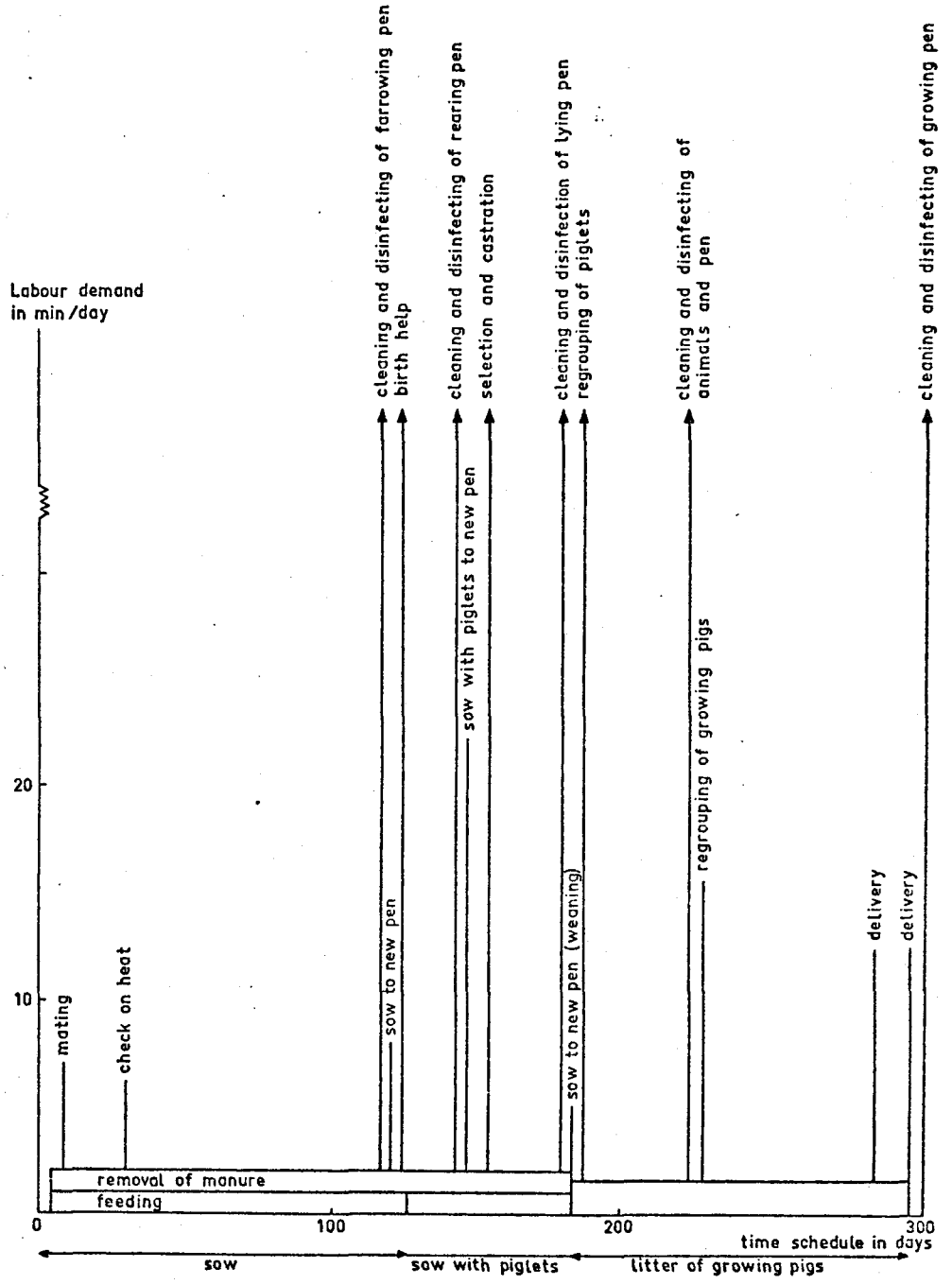
Case B:

Breeding and growing are done at the same farm, only the sows being moved once, to new pens, individually.

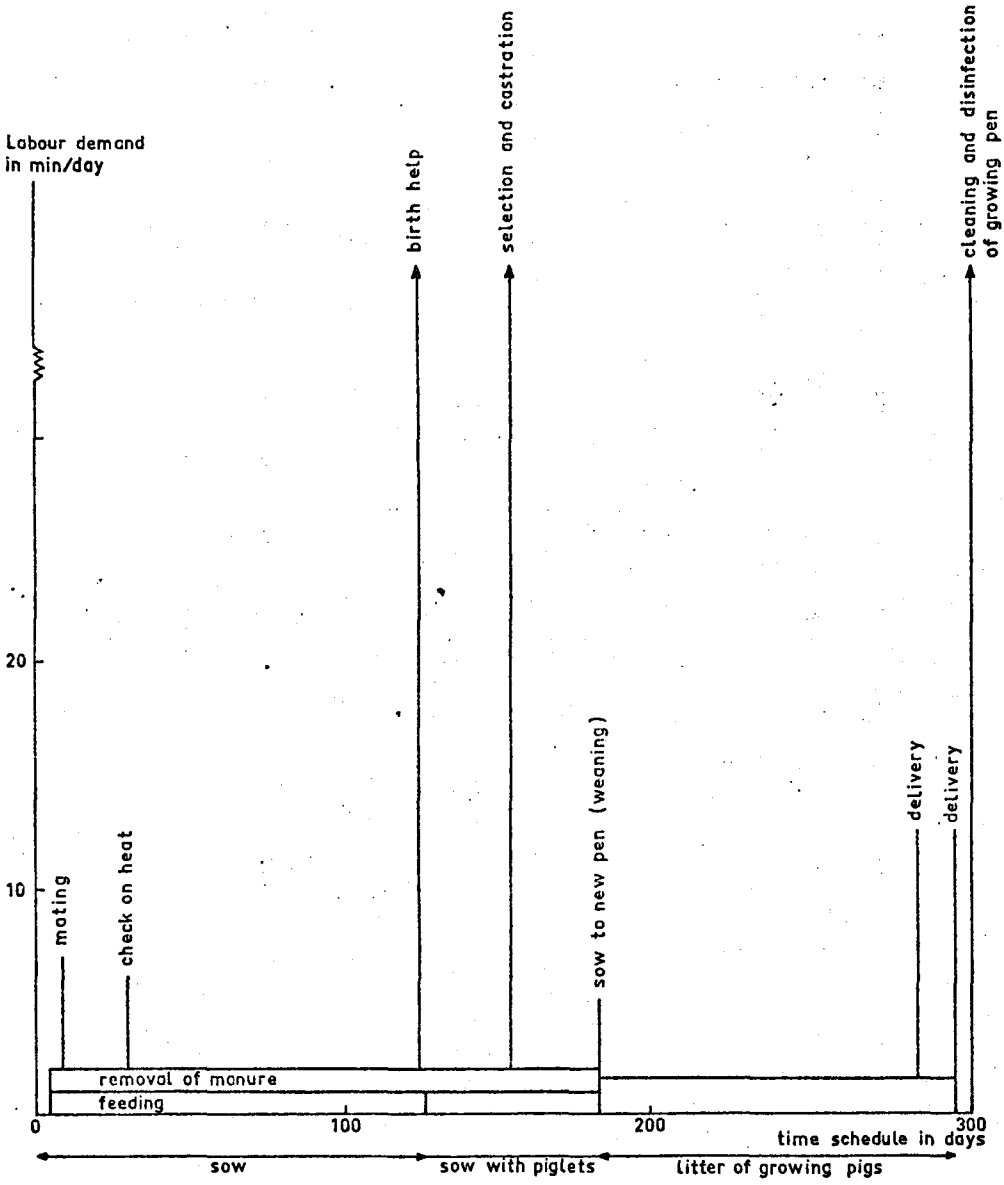
Case C:

Similar to B, except for the sows being penned in groups. During the suckling period the sows of each group are successively moved to new pens at an interval of three weeks. In this way the piglets are weaned gradually. The selection (inspection) of each farrow is postponed till the end of the growing period. In addition the male pigs are supposed notto need castration. To attain an optimum labour productivity it is essential that the daily labour demand per farrow shows the least possible fluctuation. This requirement is best met by case C with only four peaks against 12 for A and 5 for B. Additional advantages of this case are:

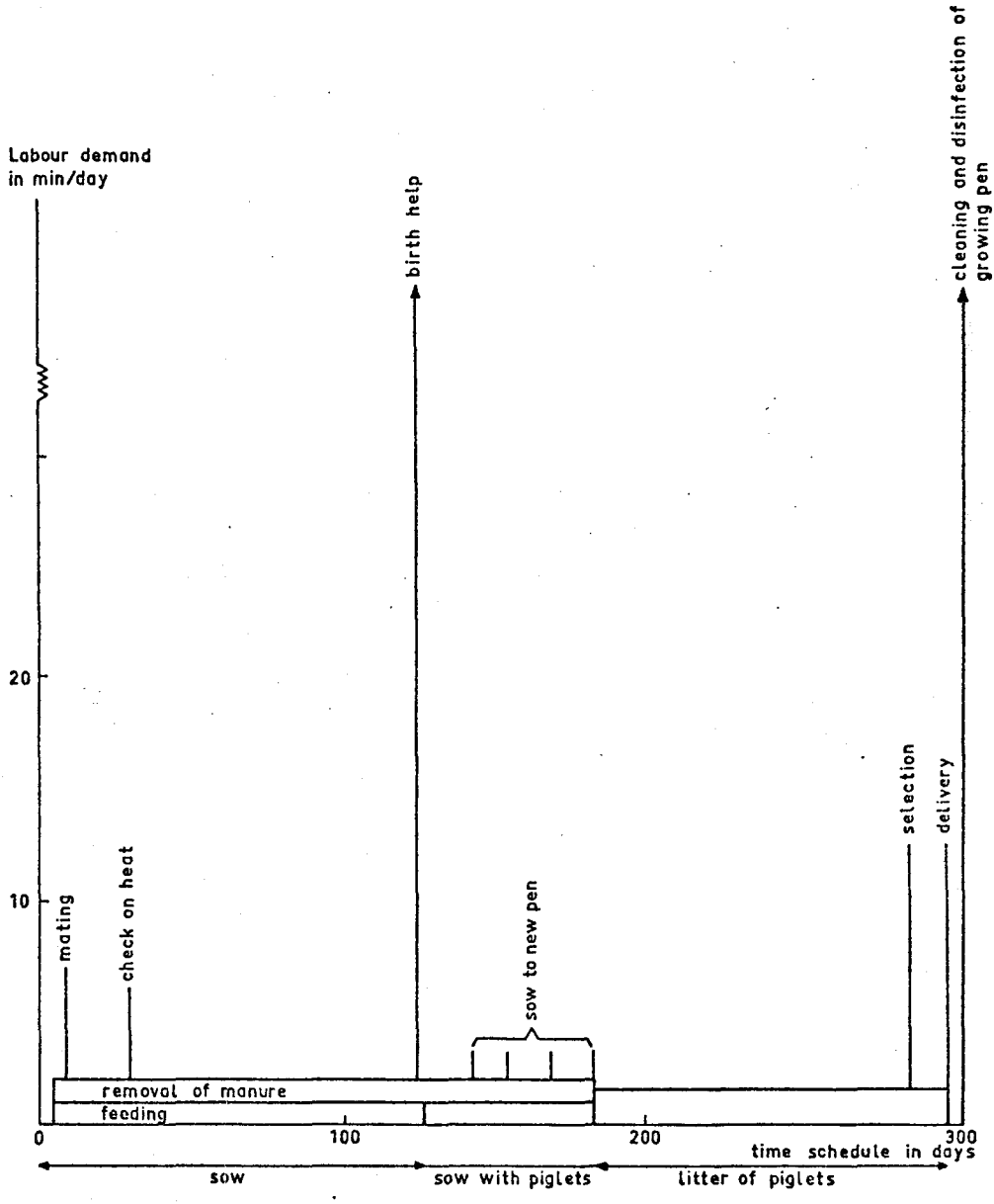
- Gradual weaning, largely preventing delays in growth of the piglets.
- Longer suckling period enabling the lighter piglets to gain in weight on the stronger ones. Thus, a more uniform weight of all piglets in a pen can be achieved. This is highly desirable if final delivery of the grown pigs is to take place once per unit.
- One man is able to take care of 32 sows plus the total growing stock derived from them. A man's capacity is largely dependent on his willingness to make some long strenuous days in each 21-day period, with the other days being rather shorter.



Case A: Different farms or separate stalls for breeding and growing



Case B: Breeding and growing done at the same farm, only sows being moved once to new pens individually



Case C: Breeding and growing done at the same farm using regular regrouping system for sows.

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