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MANAGEMENT IN RABBIT PRODUCTION - A GRADUATOR FOR TRANSFER OF KNOWLEDGE INTO PRODUCTION LEVEL.

W. Schlolaut

Neu-Ulrichstein, W-6313 Homberg, Germany

Management of animal stock results from practical application of the attendant's experiences and his know-how in the fields of veterinary medicine, feeding, husbandry, reproduction and marketing in order to gain optimal economic efficiency.
Success of management depends on:
General level of knowledge and the degree of information about this.
The manager's ability to transform his knowledge and experiences into practice and
his economic motivation to do so.

This congress again presented a wealth of fresh knowledge in various disciplines. The succeeding statements will try to critically weigh the extend of transfer from existent knowledge into production level. With this in mind there will be pointed out some crucial matters where in the speaker's view there seems to be pent-up demand.

Development of rabbit production in the time intervening since the last WRSA-congress 1988 in Budapest as far as volume of production goes is described only in some Western European countries. (France, Spain, The Netherlands, Germany). Rabbit meat in these areas is one of the few agricultural products which during the last years had firm or even rising prices.

Partly this is a consequence of rising demand. Apparently rabbit meat in industrial countries increasingly profits from its image of a health- food proper (low content of cholesterol and calories, white meat, producing little uric acid). Furthermore, price supports in the former East-bloc in order to export rabbit meat at dumping prices have been discontinued. However to an extend this did lead to a decline in rabbit production there. On account of rising prices in the Romanic countries , in the Netherlands and in Germany stocks increased. In contrary to this, Thomas (1988) reported from Great Britain that there was no progress concerning volume of production. This mainly is attributed to a lack of professional management in larger production units which prevents adaption to requirements of the market. This judgement of the situation tallies with Patton's report (1989) from the USA.

There are no informations about the development of subsistence-oriented rabbit production in the countries of the third world. It would appear that the euphoria which accompanied this field concerning meat production in former congresses of the WRSA has been replaced by disenchantment. In former reports planning of projects prevailed. It would be profitable to learn how development has been getting along in between and to what extend proclaimed aims have actually been reached. An analysis of successes and problems which were recorded in various projects on an international level would be desirable, too. This could create the basis for a system of information on management of rabbit meat production in developing countries. There are tips for the organized buildup of such an instrument

in the "Rabbit Resources Management Manual" as described by Reynells (1990) for the USA.

One can draw a positive balance for the increase of angora production in the PR of China. Thus Tan reports (personal information) that in a project working with German support, wool production of the test-animals almost quadrupled (1600g in the does, 1300g in the bucks). There was a general increase in angora production at the same time which was supported by price politics. But this resulted in a worldwide crash of angora prices. Because of this, production in other countries (Chile, Hungary,) succumbed almost completely.

Detailed analyses concerning the economic situation have been reported from France and Spain only. They come from selected operations. (Sinquin, 1991; Koehl, 1991; Iruretagoyena, 1991). The French analyses have been performed in the same manner since 1974. Thus by comparison there can be derived indications of development of the economic sphere in the intervening time. According to the results reported by Koehl (1991) for the years of 1986 and 1990, profit minus cost of feed per doe's cage increased by 17%. But this mainly was achieved by increasing the number of does kept per cage from 1,19 to 1,35 on an average (table 1), i.e. a raise by 13%. Thus decline in productivity by losses, selection and infertility could be compensated to a large extend. The rise of income which surpassed cost of feed thus mainly resulted from a certain knack and only to a small extend could be accounted for by an increase of animal performance.

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As reported in Budapest previously (Schlolaut 1988), compared to other livestock species, losses of does and young rabbits are extraordinarily high. Mortality of the latter from birth till slaughtering was 33,4%. 143% of the does caged per year had to be replaced. This means that breeding stock as a rule does not survive its first year of production. Regretfully the share of mortalities has not been stated. Spanish studies (Iruretagoyena, 1991) in 33 resp. 11 operations found yearly mortalities of does of 35% and 46,7% on an average. In does and young rabbits it is six to eight times as high as the numbers found out under institutional conditions (Schlolaut, 1981). These considerable animal losses in commercial rabbiteries are several times higher than in other livestock species (e.g. poultry, pigs, cattle). With these the rabbit has to compete and the high rate of losses apparently is not a specific phenomenon of the rabbit but the consequence of flaws in management. In this respect commercial rabbit production still remains in the initial state of its development.

Sorry to say neither the extensive French analyses of economy nor the Spanish studies mentioned afore state any hints as to the causes of the high losses. According to Rossell et al. (1991) in Spain the losses until weaning mainly are caused by staphylococcal infections and diarrhoea which are diseases mainly supported by faulty hygiene of the housing. There are no statements concerning the percentage of different causes for the losses of does nor about average age at the time of leaving production. These studies represent efficiency per doe cage, not per animal and the economic conclusions derived complicate recognition and correction of management errors.

They rather obscur them by speedy replacement of does that left production. If efficiency would be related to each and every animal housed, as is done in poultry and pigs, this could be avoided. Stating the range of variations of the results in different operations would be desirable as well, together with breeding animals' origin (population and breeder). Breeders and multipliers both profit from high rates of replacement. It would appear that some of them are not really interested in improving the health-status of their stock. There are only a few representative reports on random sample tests of breeding stock.

Progress of performance based on heredity will inevitably be slowed down together with acuteness of selection by high replacement rates. Does which have to be kept in order to compensate losses require additional housing capacity, which lowers the profits on investment. These between 1983 and 1990 were reduced by 28%, which of course had other disadvantageous causes, too. After all, continuous replacing of high losses will deterioriate hygienic conditions. Thus it will add to higher mortality. In order to reduce this risk some breeding units will hand over replacements for alien doe stock at an age of 2-3 days. These will be reared by does in the new unit.

Comparison of mortalities of young animals in 1974 with recent ones (Henaff 1987) shows slight rise rather than decline. There are no statements about does.

The high rate of losses in young rabbits and the share of replacements of does suggest that the knowledge gained in two

decades hardly has led to changes in producing operations. This goes for matters of veterinary medicine, feeding, husbandry and genetic improvement of vitality as well. In France there is a large scope and high level of research and considerable effort in advising both officially and privately. Still the amount of management errors seems to have remained unchanged.

France is holding a leading position in the rabbit sector, therefore one can presume the situation being no better in other countries. Patton (1989) is suggesting the same , as there are only a few production units working profitably in the USA. Most of them will be in business no longer than three years. They start investing big money and the reason for their failure is believed to be faulty management. Early personal experiences of keeping rabbits as a hobby will be transferred to big commercial operations. Thomas is reporting likewise from Great Britain (1988).

The following causes are considered detrimental to management:

Hygiene being neither influenced by the size of an operation nor whether it is operated as a hobby or commercially.
Breeding animals are kept together with fattening ones.
Breeding animals are continuously being replaced from other housing or alien operations.
All in - all out systems are not in use.
SPF- animals are almost unknown.

Therefore the rabbit is the only livestock species in which basic rules of disease prophylaxis are not applied in large

operations, which is the cause of high losses of does and young animals. This observation tallies with the fact that as a rule the size of losses rises with the number of animals kept per housing unit and the duration of the operation's existence. In contrary to this finding, in poultry production losses will decline the bigger operations are, because management improves. One reason for the lack of hygiene in continuous replacement of breeding animals is said to be the necessity of full use of does' cages. This may mean that the higher losses harm efficiency more than does the odd unused cage. While this problem exists in other livestock species as well, there for economical reasons one uses the all in - all out system and young animals are kept apart from breeding ones.

One other cause is the type of housing being influenced mainly by technical feasibility in order to reduce the amount of labour, make the best of housing capacity and reduce the cost of investment. Thus the animals'needs suffer and the resulting technopathies and disturbances of behaviour shorten their lifespan.

Feeding of young and breeding animals often is inadequate to their physiological needs, which influences mortality. Reducing the ration's crude fibre content is one of the main causes for non specific enteritis. This disease is promoted by constant contact with droppings in large housing units. Common use of chemotherapeutics in order to reduce losses enlarges the risk of residues in the meat and has ecologic disadvantages. If copper - sulfate is added to the feed (Cheeke, 1988) in order to prevent enteritis, action of the

copper in the soil may create environmental problems, as is known from pig operations in the Netherlands.

In rabbit production knowledge about disease prophylaxis, feeding and husbandry is not implemented fast enough into production level. This is confirmed by Cheeke (1988) and Patton (1989). While in poultry production it takes less than five years to use new knowledge in the production sector, in rabbit production as a rule this will take more than ten years. Apparently improvement of producers' technical qualification is one of the main tasks considering prevailing conditions.

As there are high losses and a short reproductive period of breeding animals, activities which arose lately concerning animal welfare are important not only ethically but economically as well. In Great Britain (1987) and Germany (1991) recommendations exist concerning proper animal needs and prevention of cruelty in husbandry. While they often have been considered harmful to economic rabbit production they may rather be criteria of purposeful management. The fixation of measurements of cages and housing seems to be questionable. There is a lack of knowledge based on scientific research on adaptability of rabbits and discussion tends to be emotional. Therefore recommendations in Germany only concern criteria for judging husbandry, feeding and handling of the animals which are legally relevant. At this congress, Löliger's report has the recommendations of the WRSA's committee on animal welfare in that same sense.

In compliance with this, conditions of the rabbit's existence

must guarantee the essentials for this species to allow undisturbed development and functioning of body and its organs. In countries with legal regulation of the prevention of cruelty to animals it would be unlawful to let the rabbits suffer pain or damages through handling, feeding and housing if this could be avoided; care should include health prophylaxis as well . If management errors would be responsible, consequences were the same.

Centre of criticism is housing in cages, which is in common use in commercial rabbit production. It should already been prohibited in Switzerland, as it does not comply with rabbits' requirements in ethology and anotomy. (Staufacher, 1989; Wieser, 1989).

This opinion is seconded by Löffler et al. (1991) who found pathological behavior aberrations in young and breeding rabbits housed in cages. Drescher (1990) saw skoliosis, kyphosis and lordosis in the thoracic spine of rabbits kept in cages which did not occur in floor management. Contrary to this (1989) he could not find any deformations in the bones of the front- or hind legs which might have caused pain or suffering. Thus there would be no reasons for legal action. In the latter studies each growing animals until an age of 120 days had 0,09 m in the cage which was 40 cm high. Only two animals were kept per cage. In floor management there were kept groups of ten animals on 0.42m^2 per every one of them. One third of the floor was covered with straw litter.

Mentioning the measurements of the cage and other conditions in

this comparison seems to be necessary. There is a possibility that group size will influence activity of movement as much as formation of cage floor does. As the cage system can be varied in many ways it should not be rejected altogether. It may have its problems because of the technopathic disorders, but floor management is not without disadvantages either. There are lesions because of fights for social order and higher risk of infections. In this trial coccidiostats had to be administered, too.

Comparing single housing with group housing on the floor in does the latter was even harmful, as there were disturbances of behaviour and higher losses of unweaned kids. Brummer (1981) investigated groops with five does in floor management at 5m per pen. He found considerable lengthening of litter intervals, higher losses of unweaned kids (61% : 13%), higher morbidity and irritability and leasions because of does' fights for social order.

In order to avoid spine deformations one could try out group management on slatted floors. It's effect might be comparable to floor management and perhaps could be restricted to the rearing period of breeding animals. After all the span of time chosen in these trials was 120 days, about 70 to 80% longer than the usual fattening period. Furthermore one should try out whether deep litter housing is capable of lowering risk of infections, which has shortly been reported after trials with poultry and pigs (personal information by "Ecopor").

Examination of these views seems to be relevant as floor

management of young animals might lower COST OF INVESTMENT. It might bring about separation of reproductive and fattening areas, too, which is desirable for hygienic reasons in one or among several operations. Furthermore floor management with deep litter would work without heating in temperate climates. There remains the problem of inset of maturity which depends on genetic status. From this moment on fights for social order will begin among the bucks and terminate holding in groups.

Lowering cost of investment is the aim of open or half open housing which in France is being used more and more often (Blocher et al. 1990; Marionnet, 1990). Still here as usual the animals are kept in cages with grill floors. So temperatures should not go below freezing point.

While there are numerous attempts to lower cost of investment, there are few activities to reduce feed expenditure in fattening animals. This is all the more surprising, as feed cost amounts to more than 50% of the cost of production. As before there is feeding ad lib. almost without exception. Although this is more comfortable, it has several disadvantages compared to rationed feeding:

Feed requirement per kg gain and per kg wool is higher.

Unwanted fattening will occur at higher final fattening weights.

Risks of indigestion are bigger in young animals.

Service life of breeding animals will be cut short.

The easiest way to lower the amount of feed consumed is to shorten feeding periods. This goes for round troughs in group

housing, which are hoisted up after feeding time or pipe feeding systems which work by weight. The equipment producers' phantasy is asked to create solutions for the common automatic feeders. The lower gains with this sort of management are less aggravating than the saving on feed cost combined with the possibility to reach higher final fattening weights without unwanted fattening.

Since the last congress artificial insemination (A.I.) has gained interest as a means of directing production without influence of seasons (Blocher, 1990; Mercier, 1990). In France alone according to press releases there were inseminated more than 300 000 rab- bits in 1990. As early as 1979 there were first reports on use of synthetic luteinizing and releaser hormones to trigger ovulation (Paufler und Schlolaut, 1979). This procedure could act as a synchronizer of littering when used in management. There was a rather long time-lag before this knowledge was implemented into practice which is another example how hesitant rabbit producers are in accepting innovations. Practicability of this method has been proven since 1981 by a breeding operation and its multi pliers (ZIKA). So far there is a wide range of fertility results in application of this method and this is a problem. Apparently fertility is unfavourably influenced by poor hygienic conditions and husbandry in this case as in other insufficient circumstances as well. After all, A.I. is a gynecologic manipulation. When comparing it with natural service one often does not realize that in A.I. all does are taken into account, while in natural service only those are rated which tolerate being mounted. Comparing amount of labour between both

methods, all does concerned should be counted, too.

There are considerable economic reserves in rising final fattening weight, which greatly varies in different countries. Present information shows variations from 1,9 kg in Spain (Iruretagoyena, 1991) and 2,3 kg in France (Koehl, 1991), where whole carcasses are marketed, to more than 3,0 kg in Germany sold in cuts, with rising tendency in France, too. As in turkeys the cuts are more acceptable to families than variation of final fattening weight. Utilization of less wanted parts is shifted from the individual kitchen to the market. (Rips et al.).

Returns are directly related to the amount of meat produced, thus final fattening weight has at least the same influence on economy as the number of young raised per doe. Furthermore, high final fattening weight has positve effects on per carcass cost of slaughtering, meat inspection and transport. These savings are completed by reduction of expenditure for keep of the parents in relation to weight, which is much higher in rabbits than for instance in poultry. Higher final fattening weight has disadvantages in rising cost of feed, more fattening and fights among bucks after inset of puberty. Lange (1990) found considerable differences between the populations examined as to genetic influence on these parameters. At a final fattening weight of 3,0 kg, compared to the best population (ZIKA), other groups (Hyla, white New Zealanders, crosses between giant white x himalaya x w.N.Z.) had higher feed cost up to 20%, daily gains to 16% less and kidney fat as a yardstick for fattening 90% more. At final

fattening weight of 3,4 kg the best groups had not reached the figures which the other groups showed at 3,0 kg. Thus economy of higher final fattening weight seems to be influenced more by the type of animal used than is the case in lower weights. Offering meat cuts will enhance rabbits'chances to compete with other meat-producing animals. Cutting does lower the emotional barrier which results from identifying the carcass with the former pet, particularly in younger persons, even more so if the carcass is offered with the head.

The strongest impulses for upping consumption of rabbit meat in these last years, at least in Germany, resulted from propagating rabbit meat as a promotor of health. Schilken and Kreuzer (1990) and Lukefahr (1990) confirmed its conparatively low cholesterol content. However the former found a certain raise growing with animals' age. Furthermore rabbit meat has a high content of unsaturated fatty acids, especially omega-3-linoleic acid. (Schilken and Kreuzer, 1990). To the latter, prophylactic action against cardiac infarct is attributed. Here again, with growing age of the animals the content of the compounds is decreasing, the same goes for bucks in general. It is said that rabbit meat consumption will lower the formation of uric acid, one of the prerequisites for contraction of gout. In the USA proof has been found that consumption of red meat increases chances of carcinoma of the gut. This is beneficial to sales of rabbit meat and other white meat.

Production cost of rabbit meat cannot compete with other kinds of meat, thus its outstanding properties should be promoted in

a special way. As usual, introduction of rabbit meat into supermarkets in many countries is hampered by the lack of proper sales promotion and market inquiry supported by wolesale trade, as is common in other kinds of meat (Gebremedhin 1990).

There are indications of progress in quality assessment of angora wool. The existing subjective judgement of average length of hair in the fleece was too inexact and could easily be manipulated. Thus there is a proposal to state the percentage of hair which in a random sample have the length postulated for a class. (Schlolaut, 1990). For this only one measurement has to be performed. Bristle should rather be defined as a numbered quota in the random sample examined. If the amount of bristle is calculated by weight (Rougeout and Thébault, 1981), its proportion is overestimated. Bristle is heavier because it is thicker. This difference in measurements was the reason for overestimation of the portion of bristle in French compared to German angora rabbit production. Comparing races there was only a difference of 0,6% in favour of the French ones when counting instead of more than 4% in weighing. The proportion of bristle will be influenced by the manner of production, too (Fleischhauer and Schlolaut, 1990). Plucking, as is common in France, yields more than shearing. Furthermore there exists interaction between genotype and environment: In the French population proportion of bristle in plucking did show higher increase than in the German one. The latter was no good for plucking.

Development of productivity parameters in 1983 - 1990

Year		1983	1986	1990
Sl.rabbits prod./ Aver. doe/year		41,1	42,6	44,2
Relat. Occupation of doe-cage	%	104	119	135
Sl.rabbits prod./ doe-cage/year		42,8	50,6	59
Yearly renewal of does	%	141	157	143
Conception rate	%	68	70	72
Litter/av. doe/year		7,4	7,5	7,2
Mortality till weaning	%	21,3	23,2	19,2
Mortality after weaning	%	14,9	13,4 36,0	14,2 33,4
Liveweight at Slaughtering	kg	2,33	2,32	2,33
Surplus over feedcosts per doe-cage/year	FFr	489	739	867
Price/kg feed	FFr	1,67	1,68	1,57
Price/kg Liveweight	FFr	12,57	13,69	12,60

According: P. KOEHL, 1991

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Summary:
Management as presently practised in professional rabbit production seems to be improvable. This concerns average productive phase of does as well as mortalities of does and young animals. Quite often it is not fit for hygienic principles effective for bigger animal stock and technical equipment does not meet animals' requirements.
Knowledge from research into feeding, husbandry, reproduction, diseases and ethology in the last two decades has been widened considerably. However, implementation of new know-how into production level takes more time than in other lifestock species. Thus improvement of communication between science and practice is one of the prevalent problems to be solved.
As increased income is the best promotor of ingenuity at production level, there should be further development of analysis of optimal management. Its results could show the causes for less than optimal performance of stock which does not correspond with the know-how at hand.
There has been legislative action concerning animal welfare in some countries which should be considered. But just as well one has to take into account consumers' aversions against some of the production systems practiced at present, which over long terms may reduce rabbit meat sales.
Economic reasons postulate development of husbandry better adapted to ethologic and anatomical conditions. Present shortcomings not only support technopathic disorders reducing performance and quality. If floor management should prove practicable raising breeding animals and fattening young animals, this would also mean reduction of cost. But keeping in cages has many possibilities, too, of development more adapted to the animals' needs(for instance construction of cage floor, measurements of cage etc.).
Further actions towards rationalization discussed are:
Artificial insemination, limited feeding in fattening animals, rising their final fattening weights and marketing of cut meat.
Now there is profound knowledge of health-promoting properties of rabbit meat. These are lower content of cholesterol and calories and high content of unsaturated fatty acids, especially omega-3-linoleic acid. Consumers in idustrial countries are increasingly health-conscious which should be taken into account when promoting rabbit meat sales in competition with other kinds of meat.
In angora production assessment of wool quality has been enhanced considerably which elucidated specific differences in performance between populations.
In order to create a more solid basis recommending management in subsistence-oriented rabbit production in developing countries, experiences resulting from recent long-time projects should be compiled.