

## EUROPEAN ACCELERATED RABBIT BREEDING PROGRAM

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After 22 years of giving talks to rabbit breeders, and taking part in workshops, I have come to the conclusion that the two most important aspects which attract attention and discussion are: pathology in general, and the rabbit breeding programs.

I am referring basically to those farmers whose main aim is meat production, not pets, and in Spain, as well as in France, Italy, Germany, U.K., Portugal, Brazil and Malta.

There are serious areas of a lack of knowledge in pathology with regard to the typical characteristics of the rabbit, due to the special physiology and behavior of the rabbit. But because of the high death rate in many outbreaks, interest in diseases is very logical. Breeding systems are another story. There are good arguments among the "post-partum" system fanatics, both in small operations (due to the ease of better male acceptance) as well as in the most sophisticated farms (who believe that greater yearly production is obtained according to investment made) and on the other hand the detractors of the accelerated system, who recommend as a rule the breeding between 7 and 15 days after kindling, even later. Nevertheless, those who favor rebreeding later than 21 days after kindling are decreasing in number every day. Before deciding on one system or another, it is always wise to weigh up the different pros and cons since the type of female makes a difference, the percentage of replacements, the cost of feed and labor, with respect to the market price of rabbit meat etc., etc., and, most important, the rabbit breeder's objective, since it is not the same to breed rabbits as pets or to groom them for rabbit shows, or to breed them for meat production as a sound business proposition.

Besides the differences in genetics, handling, sanitation and feeding, the most influential aspect in productivity is the breeding program used.

The aim must be simple: "Obtain the maximum with what you have". This axiom has come to us from the U.S.A. and we have learnt it well. Keeping this in mind, if a female rabbit is ready to be rebred immediately after kindling, and gestation lasts a month, it is "possible" to get 12 kindlings a year. Since there are 13 fertilizable eggs, the "possible" aim is to produce 156 kits per doe per year. To surpass this theoretical figure will require great genetic changes.

The more we can produce, and doing it at a lower production cost rate that the possible intake, the greater the profits.

If this is one aim, and many rabbit breeders believe it is, merely because of the mathematical simplicity, then there is only one way to do it and that is by using an accelerated post-partum rebreeding program.

But things are not that simple. There are many other factors involved. To illustrate what happens in Europe, I shall describe the present situation in four sections: According to the average; a description of the accelerated breeding program; the pros and cons of the system seen from a scientific and research point of view; and finally the specific results of a year's production of a farm. This farm is typical as far as financing and sophistication are concerned, but with good animals, good management and good feeding, and using the accelerated rebreeding system.

A. PRODUCTION AVERAGES

The province of Barcelona, in the northeast of Spain, where I have lived all my life, with a surface area of nearly 3,000 square miles and population density of 1,400 per square mile, is traditionally a rabbit producing area, with many small traditional farms, with an annual production of 8,400,000 rabbits; i.e. more than 2,800 per square mile per year.

A study by the Diputacion de Barcelona (Valdeperas-Royo, 1977), gave the following results, among others:

Average # females per operation studied: 130  
 Average between kindlings: 70.4 days  
 # kits born alive per kindling: 7.88  
 # kits weaned per kindling: 6.94  
 Average weaning age: 33.5 days  
 Average sale age: 64.9 days  
 Average sale weight: 3.95 pounds  
 Female replacement per year: 52%  
 # of fryers sold/female/year: 35.4  
 Kindlings per year/female: 5.2

The average in Spain, with a high proportion of small farms (less than 15 females) is around 28 fryers sold/year/female. There are 95,000,000 rabbits from 3,400,000 does and of these 50% are in small farms.

In France, which is the first producer in the western world, according to various sources (Henaff, Sinquin and Lebas, 1981) 5,100,000 females produced 130,000,000 rabbits, i.e., 25.6 per mother. 50.3% are small or traditional, or rural operations. In Italy and other countries, figures are similar.

In the U.K. where total production is much lower and the per capita consumption is very low, traditional breeding programs are still being used, even in big operations.

We can see where averages come from, by classifying rabbitries by production capacity. A classifying system by segments may be done with an eye on the size and production of the operation, although there is no direct relation between the size and the quality of handling and productivity. An example of the averages in the top three European countries production (France, Italy and Spain), could show the following classification:

	<u>%</u>	YEARLY PRODUCTION AVERAGE
Traditional farms or back yard; less than 20 Does	= 50	20 rabbits/does cage
Complementary farms to farming; 20 to 250 Does	= 30	36 rabbits/does cage
Industrial Farms; more than 250 Does	= 20	40 rabbits/does cage
TOTAL		28.8 rabbits/does cage

This average needs improving.

One of the difficult aspects to be improved, is the fact that the majority of rabbit breeders firmly believe that they produce far more than they actually do. This is basically due to a lack in controls and lack in objectives.

#### B. ACCELERATED BREEDING PROGRAM DESCRIPTION.

The program I am recommending, and which is one among many, and which is similar to the one promoted by the main producers of "selected hybrids", is the following:

First breeding: The average type does (New Zealand White) are started at 4 to 4 and half months, weighing approximately 80% of their adult weight. Start them with adult and tried males. The males are started between 4 1/2- 5 months, preferably with adult, calm and in heat does. The dwarf breeds can be put forward by 2-3 weeks and the giant ones retarded by 2-3 weeks. Both for males as for does.

Rebreeding: a) Does with 7 or less kits alive at birth and well-nourished, should be rebred within 36 hours of kindling, as well as in those seasons (autumn) when reproduction is more difficult.

b) Does with 8 or more live-born kits, or thin does or that have some problem, should be rebred between 7 and 15 days after kindling.

Handling and feeding should be excellent, and the genetic quality of the stock should be high.

Some recommend injecting an anti-stress product before kindling, as well as soluble calcium.

With this program the annual replacement percentage tends to fluctuate in practice between 70% and 110%, i.e. lasting between 17 and 11 months for average production.

#### C. RESULTS AND TECHNICAL OPINIONS

Extensive bibliography exists on this matter, and there seems no need to list it, however, there does seem to be a need to underline that does have a 16 day follicular cycle, with the corresponding male acceptance variation according to the annual season. The way in which covering takes place influences acceptance and even the number of fertilized ovules, and in acceptance the color of the vulva also plays a part (Hill, 1933, Moret, 1976; Delaveau, 1978).

We know that the doe accepts the male very well on the very same kindling day, although in tests carried out, the release of ova is lower. From 11.1 at kindling, it goes up to 14.0 after three weeks (Torres, 1977), i.e., lower prolificacy (8.7 against 7.7 per kindling) (Surdeau, 1978).

Fertility rate seems to be lower too, although results vary. (Foxcroft, 1973).

Obviously, delaying rebreeding and weaning does not improve the genetic quality of kits to be kept for replacement or sold as reproducers.

The "wear and tear" of the does is also debatable, and also their production lives, etc. (Prudhon and Lebas, 1975).

The results of a test (Surdeau, 1978) show the following facts. Comparing 20 does with "post-partum" rebreeding against 20 does with rebreeding 10 days after kindling, with a total of around 100 kindlings in each system:

	REBREEDING BEFORE 36 H	REBREEDING AT 10 DAYS
% breeding effectiveness	75	83
Days between kindling	36	46.3
# live born/kindling	6.4	7.7
# weaned/kindling	5.1	6.4
Mortality rate	16.5%	16.5%
Weight of kits (grs.)	592	604
Feed conver. total rate	3.36	3.20
# Weaned rabbits/year/doe	51.7	50.4

There are significant individual results (over 5%), but there is no significance in the final results.

According to this, and lacking further confirmation and owing to greater handling complexities, it does not seem advisable to promote the accelerated program (Also confirmed by Surdeau, 1980; Raymundo Rodrigues, 1981).

But we must bear in mind that the 50 rabbits produced with the "Rebreeding at 10 days" system are almost at the "Ceiling" of productivity, and that in practice it is difficult to obtain.

In other tests the results vary more, but it is often in favor of "post-partum" rebreeding.

Using a series of mathematical formulae (Matheron, 1980) one can conclude that in average type operations, that is a production of 6 weaned rabbits per kindling, a production increase of between 12 and 16% can be obtained, following the "post-partum" program which is better than the 10 day rebreeding system, even when allowing for a drop of 1 rabbit per kindling.

The 6.4 live born kits/Kindling from the Surdeau test, is low compared with the 8 in the good farm using "accelerated rebreeding".

#### D. RESULTS FROM A COMMERCIAL RABBITRY

In Spain, and in France and Italy, too, industrial rabbit breeders tend to follow the accelerated program. This is why we find more and more farms with over 500 does, which means, that for the capital outlay and the offer of full-time employment to several people, they must calculate very finely so as to obtain top productivity.

The tendency in France and in the north of Italy is to go for buildings with environmental control, for reasons of climate and productivity. This is not the case in Spain, where the majority have static ventilation, i.e., windows, or even open-air ones. That is because we are interested in seeing the best results with the least investment.

In May, 1982, I visited a farm in Brittany (France) with 300 does and with static airing by means of windows, deep pit (removal of manure once a month) and without heating, and with three lots of 100 Hyla does, select hybrid, per house. They consume PURINA whole feed.

They still hope to improve this extraordinary production by eliminating part of the mortality, above all when fattening, which they consider excessive and so do I.

Note that to reach 58 fryers sold per cage, 9 kindlings, must be obtained per cage. The replacement of breeders was low too, only 72% a year.

Facts from 15 September, 1980 to 15 September, 1981:

Positive palpations.....	87.6%
# Kindlings per cage .....	9.14
# Total fryers per cage/year.....	82.62
# Total fryers per kindling.....	9.04
# Live born per cage/year.....	78.42
# Live born per kindling.....	8.58
Mortality (born alive/total born).....	5.03%
# Weaned litters and sold per cage.....	8.62
# Weaned fryers per cage and year.....	63.68
# Weaned fryers per litter.....	7.39
Nursling mortality.....	18.80%
# fryers sold per cage and year.....	57.85
# fryers sold per litter.....	6.71
Fattening mortality.....	9.20%
Average weight (at 73 days ave).....	2.320 kgs. (5.1 pounds)
Daily growth under fattening.....	38.6 gs.
Live weight per does cage.....	134.2 kgs. (295 pounds)

By increasing replacement, that is, by eliminating the least productive does and avoiding mortality, they will produce more every day. The recommended replacement average in these operations is 100% per year.

The objective of 60 sold per doe's cage per year is standard today. Whereas only 5 years ago to aim for 50 seemed high. When will we reach 100?

If a rebreeding program at 15 days is followed, with a theoretically possible 8 kindlings a year (365 k46) at 13 ovules only, a possible 104 kits can be produced, instead of 156. But later (20 or more days) the figure drops sharply.

I would venture to recommend either breeding program, without weighing up the pros and cons mentioned at the beginning. But what is true is, that if productivity aims are higher each day, it will be of vital importance to make it a rule to use excellent animals, feeding, handling and sanitation, in the aforementioned accelerated system, which consists in starting at 4 months and rebreeding certain does within 36 hours of kindling, and only to wait 8-15 days in special cases, for does with big litters or whose body condition is not up to it.

If there should be any problems in adopting the accelerated program (average 5 days) such as the weight of kits being too low at 28 days to wean without problems, or exhaustion of does, or high mortality, etc., it would be advisable to solve these problems, rather than blaming the system.

I hope that what I have said will be for the good of rabbit farm profitability, as this has been the sole purpose of this paper.

### References

- Delaveau, A. 1978. L'acceptation de l'accouplement chez la lapine et ses relations avec la fertilité. 2e. Journées de la Rech. Cunic. Paris - communication no. 19.
- Foxcroft, GR. and Hasnain M. 1973. Effects of suckling and time to mating after parturition on reproduction in the domestic rabbit. Jour. Reprod. & Fert. 33:367-377.
- Henaff, R., et al. 1981. La France cunicole 1981. Cuniculture 43. 1-5.
- Hill and White 1933. Cited by Delaveau (1978).
- Matheron, G. 1980. Etude comparative a priori de deux rythmes de reproduction chez lapin. Proc. II World's Rabbit Congress - Barcelona I 303-305.
- Moret, B. 1976. Mentioned by Delaveau.
- Prudhon, M. and Lebas, F. 1975. Le rythme de reproduction, jusq'ou l'intensifier. Une production de l'avenir: Le lapin. Revue de l'elevage, no. extra, 41-46.
- Rodriguez, R. 1981. Los ritmos de reproducción y productividad en Cunicultura. VI Symposium Cunicultura Zaragoza. 37-49.
- Surdeau, P. 1978. Comparison de deux rythmes de reproduction chez le lapin de chair. Premiers résultats. 2e. Journées de Rech. Cunicole Paris - communication no. 20.
- Surdeau, P., Materon G. and Perrier G. 1980. Etude comparée de deux rythmes de reproduction chez le lapin de chair. Proc. II World's Rabbit Congress - Barcelona I. 318-319.
- Torres, S. 1977. Aspects physiologiques de la reproduction chez la lapine. Cuniculture 4:137-141.
- Valdeperas, J.M. and Royo, E. 1977. Resumen de los resultados obtenidos por la gestión tecnico económica de explotaciones cunicolas de la Diputación Provincial de Barcelona, II Symposium Nacional Cunicola - Pamplona 195-200.

**Research Review: Association of Iota-like Toxin and *Clostridium spiroforme* With Spontaneous and Antibiotic-Associated Diarrhea and Colitis in Rabbits**

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Reviewed by N.M. Patton

There has been much recent interest in both spontaneous and antibiotic-induced enterotoxemia in rabbits. Although a toxin that is specifically neutralized by anti-*Clostridium perfringens* Type E iota toxin has been implicated by Patton et al., neither *C. perfringens* Type E nor any organism with the ability to produce a cross-reacting toxin has been isolated. This paper, however, describes a helically coiled, anaerobic, gram-positive spore forming bacillus, which has been identified as *Clostridium spiroforme*. This bacteria was isolated from the cecal contents of 27 rabbits with spontaneous diarrhea. These rabbits were from four laboratories in the United Kingdom, six commercial rabbitries in France and one laboratory in the United States. All of these rabbits had a toxin present in their cecal contents that was neutralized by anti-*Clostridium perfringens* Type E iota toxin, but not by other clostridial anti-toxins.

In addition, the paper reported that four New Zealand White rabbits with induced clindamycin-associated colitis (clindamycin is an antibiotic) were positive for *C. spiroforme*. These animals also had the iota-like toxin

present. Iota-like toxin was not found in 72 healthy rabbits, although *C. spiroforme* was found in two of them. The authors speculate that the two positive *C. spiroforme* healthy rabbits may have been rabbits which recovered from a diarrhea episode. By the use of a glucose fortified meat media the researchers were able to induce the isolated *C. spiroforme* bacteria to produce iota-like toxin in vitro. This toxin was also neutralized by anti-*C. perfringens* Type E iota toxin.

(Reviewers comments. This paper is a significant milestone in the search for the cause of enterotoxemia in rabbits. We have seen these organisms under the microscope but were unable to grow them prior to the publication of the Borriello-Carman paper. It is interesting that it takes glucose to get the bacteria to produce the toxin. Perhaps the carbohydrate (glucose) overload in the rabbit hind-gut, which we proposed several years ago, will take on new meaning to nutritionists and veterinarians in all countries. We continue to believe that the rabbit digestion system is not designed to digest high levels of starch and other forms of readily available carbohydrates.)