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The Economics of Rabbit Rebreeding Systems

Nephi M. Patton and Anne C. Ayers
Rabbit Research Center
Oregon State University
Corvallis, Oregon 97331

Every rabbit raiser is faced with the decision of when to rebreed a doe with a litter. There are probably as many rebreeding schemes as there are rabbit raisers. However, most fit into some kind of weekly pattern. Rebreeding usually occurs at 7, 14, 21, 28, 35, or 42 days postpartum. In fact, a few rabbit raisers rebreed the day after kindling.

When the economics of rabbit raising are considered one is always trying to determine key factors. Because the initial major expense is for a building and cages, it was decided to examine the affects of various breed back systems on number of cages required, to see if this might be a key factor.

The commercial rabbit industry has been led to believe that the way to increase profits from raising rabbits is to increase the number of litters each doe produces in a year. Theoretically about 11.5 litters per year can be produced by using postpartum (1 day after kindling) breeding. With a 42-day breed back system only 5 litters per year can be produced. When an intensive breeding system is used the young rabbits must be weaned to a new cage before they reach market weight. The earlier the breed back system the earlier the weaning must occur, especially if the doe is allowed a few days rest inbetween litters.

A commercial rabbit raisers usually sells fryers when they reach 4-5 pounds depending on the particular processor to which they sell. If one takes the mid-range of the 4-5 pound market weight (4.5 lbs.) to use as a consistent market weight, it takes about 9 (63 days) to 10 (70 days) weeks to reach this weight. Rabbits from small litters reach it sooner while rabbits from large litters reach it later. If weaning takes place at 25 to 30 days of age, which must be done in very intense breed back system, a second cage for these rabbits for a minimum of 33 (63-30=33) days and perhaps as long as 45 days (70-25=45) is needed. In either case it means that at least one additional cage is necessary per doe. However, not all does raise their litters and so a small decrease in extra cages will occur, but some litters won't reach market weight on time and this increases the number of cages necessary, so one seems to offset the other.

It appears then that a double set of cages is needed for very intense breeding systems and more building space unless the vertical space of a building is used in a tiered system, which may interfere with ventilation. However, if these extra fryer cages were filled with additional does, then theoretically a grower could produce as many rabbits as with the very intensive breeding because the production of two does would be compared to one intensively bred doe.

This study was designed to examine the production, cages required and economics of a very intense breeding system compared to a nonintensive breeding system.

Materials and Methods

Sixty New Zealand White breeding does were randomly assigned to two different breeding systems. Thirty rabbits assigned to group A were rebred one day postpartum. Thirty rabbits assigned to group B were bred back 42 days after kindling. Does in both groups were bred to the same bucks. All does were at least primiparous at the time of assignment. Replacement does in both groups were junior does between 4 and 5 months of age. All does on study were kept in 30"x 30" x 18" wire mesh cages with automatic drinking valves and "J" type feeders. Does in both groups were fed the same diet which is presented in Table I. The study was conducted for a period of one year. Results were analyzed by Snedecor and Cochran's "t" test with unequal "n".

Offspring from group A were weaned at 25 days of age and moved to similar cages in an adjacent row. Offspring in group B were left with the mothers until they reached market weight. Litter weights and the number of rabbits were recorded at 21 and 56 days of age. Mortality was also recorded. The weaned rabbits from group A were given a fryer diet at the time of weaning. The formula for this diet is presented in Table II.

To try and maximize the number of litters produced by both groups, does that would not breed back on schedule or were in poor flesh were rested until they regained their weight. To offset this loss in production a junior doe was bred to replace the senior doe so that 30 does were always in the study for each group. As senior does regained their weight they would be rebred as a replacement instead of a junior doe.

For a period of three months during the trial year the weaned offspring of group A were given the doe diet and at 56 days number of rabbits and litter weights were recorded. Mortality was also recorded during this time period.

Results and Discussion

The results of the one year study are found in Table III. Every breeding parameter measured except 21 days weights and total rabbits produced were higher or equal for group B when compared to group A. The 56 days weight comparison for both groups favors group B by 129 grams per fryer which is statistically significant at the .01 level of probability. The specific numbers of rabbits and mortality figures are found on Table IV. There was about a 6% difference in total mortality favoring group B (33.3 vs 27.2). The results of a three month feeding trial using the doe diet to feed weaned fryers is found in Table V. The weight gains in this study were also significantly in favor of group B ($p<01$). Group A required an average of 30 additional cages to house the offspring produced from the intensive breeding system. This varied from month to month and fluctuated from 27 to 34 additional cages.

Examining the actual data of both groups, it is easily seen that group A outproduced group B by 64.6% (1636-994=642÷994=64.6%). However, if the 30 fryer cages had been committed to 30 extra does in group B, the production of group B would have been about 1988 fryers which is 21.5% (1988-1636=352÷1636=21.5%) increase over group A. While this 21% increase in fryers will not be all profit, because of increased feed costs to feed the extra fryers and the increased cost of more does, it should substantially increase the net profit back to the grower.

The doe mortality in both groups was virtually identical (see Table III). However, the culling rate for does that would not perform or developed some malady was 78% higher for group A when compared to group B. This seems like a definite financial advantage for group B with less replacements needed. However, if the grower had twice as many does with the 42 day breed back system so that all cages were filled with producing does, this culling advantage for the 42 day breed back system may be reduced because twice as many does would be at risk.

The does in group B produced 158 litters during the year. This is 5.3 litters/cage/year. The group A does produced 286 litters during the year which is an average of 9.5 litters/doe/year. Thus, it can be seen that group A was not able to produce the theoretical 11.5 litters per year, in fact, they were only able to produce 83% of that theoretical number. In addition, the percentage of losses in kits from birth to market was 33.3% in group A and only 27.2% in group B (see Table IV). Thus, kit mortality also favors the non-intensive breeding system.

Fifty-four marketable rabbits were produced per cage in the postpartum intensive system of breeding. This compared to 33 produced in the non-intensive group. However, if twice as many does were used by putting does in the cages occupied by fryers, 66 rabbits could have been produced in the same space being used to produce 54.

One could speculate that a semi-intensive system of breeding such as a 21- day breed back would be the best income producer of all. However, by examining the data it is quickly learned that this is not the case. The young still must be weaned at about 7 weeks of age to allow the doe to kindle the new litter. This means that an additional cage is needed for 2 to 3 weeks. This means that about 1/3 to 1/2 additional cages are needed for fryers. The number of litters theoretically possible is reduced to 7 per year. In an intensive breeding system using postpartum breeding, as was done in this study, a theoretically 11.5 litters per year can be produced. However only 9.5 litters were produced, which is a reduction of 17% in the number of litters born. If the theoretical number of litters produced for the 21 day breed back system (7) is reduced by 17%, about 6 litters per year are produced. Using the same average number of fryers at 56 days for group A found in Table III (5.8 rabbits per litter) and multiplying it by the 6 litters produced, one comes up with about 35 rabbits per cage per year, but additional rabbits could have been produced by using the extra fryer cages for does. In our current study where 30 cages were used an additional 10 cages (1/3 x 30) would have been necessary for a 21 day breed back system. These 10 cages filled with does would have produced an additional 330 fryers (33 x 10) for market. Therefore the 21 day breed back system would have produced 1044 marketable fryers (30 x 6 x 5.8), but the 42 day breed back system would have produced 1324 (994 + 330).

By using the information generated in this study a model for any breeding system can be set up and predict fairly well the financial outcome of the breed back system.

The weight of the fryers at 56 days favored the non-intensive system. However, it was realized that the fryers kept with their mothers were getting doe diet with a higher energy level for about a month longer than the weaned fryers switched to fryer diet at 25 days of age. A three month study was conducted feeding the doe diet to both weaned and non-weaned rabbits. As can be seen from Table IV, the weights still favored the fryers kept with their mother by about

180 grams (about 1/3 pound). This suggests that taking rabbits at a young age and moving them to a new cage even within the same rabbit house creates a stress that reduces weight gains. Feed intake was not measured in this study, but most rabbit raisers are convinced that it takes several days for young weaned rabbits to regain their normal eating patter and this may have reduced the weight gains for the weaned rabbits.

If the weight gains for the total year are compared to the weight gains for the three month study, it is observed that the difference between fryers kept with their mothers and the early weaned fryers was greater (180 grams compared to 129 grams) for the short study. There are perhaps two explanations for this. First, the 3 month study was run in late winter and when more energy is needed to keep warm. Perhaps the early weaned fryers lacked the body warmth of the doe and used more energy to keep warm. The second explanation could be the diet itself. An increased amount of diarrhea was observed with the fryers in group A fed the higher energy doe diet. In fact, mortality was greatly increased (see Table V) during this time. It was nearly 3 times higher for group A than group B. This suggests that the higher energy diet caused an enteritis problem. Why fryers with their mothers don't experience this problem could not be determined, but again it may be related to stress or some beneficial effect of the mothers' milk.

Table VI shows the economics of both breeding systems used in this study. An additional theoretical group called C was added to this table to show the economics of utilizing 60 doe cages. The doe diet in this study cost $7.80 more per ton than the fryer diet and that difference is used in calculating the additional cost of feeding doe diet to fryers kept with their mothers. In addition, the extra feed utilized in growing the extra 352 fryers (1988-1636=352) in group C was doe diet which costs $185/ton. For this table all fryers were sold for $3.50 at about 4.7 lbs, had a feed gain ratio of 3:1 and were considered to weight 1 lb when beginning to eat significant amounts of pelleted feed. Additional income was calculated for fryers in group B and C because they were 1/4 lb heavier when sold to market. By comparing group A and group C in the final column a difference of $1157 is found. This suggests that a rabbit farmer could make an additional $1157 net profit by using the non-intensive breed back system. While this difference is not completely accurate it does demonstrate the economic advantage of a non-intensive breeding system. To be more accurate the initial cost of the extra 30 does should be deducted. However, these costs of about $15/doe are amoritized for 2-3 years. Another very difficult area to

calculate is the difference in feed intake of the doe themselves when bred intensively or non-intensively. Sixty does bred non-intensively will probably eat more than 30 does on an intensive breeding program, but feed intake was not measured in this study and therefore remains an unknown variable. However, a doe eats considerably more during lactation than at any other time during the breeding cycle and intensively bred rabbits have more lactation periods than non-intensively bred rabbits. This may cuase the total feed intake for 30 intensively bred does to be similar to 60 non-intensively bred does.

Conclusion

Contrary to popular belief this study has demonstrated that a non-intensive system of breeding, using all cages for does and selling the offspring directly to market may be superior in producing income when compared to a very intense system of breeding.

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TABLE I
Doe Diet

Ingredient	Percentage
Alfalfa	44.50
Wheat mill run	45.40
Molasses	3.00
Canola oil	2.40
Meat meal	2.40
Salt	.50
Vitamin A*	.35 (7 lbs)
Vitamin E*	.20 (4 lbs)
Pellet binder	1.25
	100.00

* vitamin A 1,000,000 I.U./lb
* vitamin E 5,000 I.U./lb

Analysis

Digestible energy	2600 Kcal/kg
Protein	16%
Crude Fiber	16%
Fat	5.5%
Calcium	.9%
Phosphorus	.7%

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TABLE II

Fryer Diet

Ingredient	Percentage
Alfalfa	56.80
Wheat mill run	37.00
Molasses	3.00
Meat meal	.80
Salt	.50
Vitamin A*	.35(7 lbs)
Vitamin E*	.20(4 lbs)
Copper sulfate	.10
Pellet binder	1.25
	100.00

* vitamin A 1,000,000 I.U./lb
* vitamin E 5,000 I.U./lb

Analysis	
Digestible energy	2300 Kcal/kg
Protein	16%
Crude fiber	18.5%
Fat	2.9%
Calcium	.9%
Phosphorus	.6%

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TABLE III

Reproduction Performance Between

Postpartun Breed Back (A)

and

Forty-two Day Breed Back (B)

	Group A	Group B
% Conception	80.4 (2.3)	90.2 (1.8)*
Avg. No. Born	8.6 (.28)	8.6 (.34)
Avg. No. Born Alive	7.9 (.28)	8.1 (.35)
Avg. No. at 21 days	6.1 (.17)	6.5 (.23)
Avg. Kit Wt. at 21 days (grams)	323 (6.4)	312 (7.1)
Avg. No. at 56 days	5.8 (.15)	6.3 (.26)
Avg. Fryer Wt. at 56 days (grams)	1533 (20.8)	1662 (23.1)*
Total No. Fryers to Market	1636	994
No. of Does Dead	15	13
No. of Does Culled	41	23

Parenthesis contain standard error of the mean

* Statistically significant ($p<.01$)

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TABLE IV

Kit Production and Mortality Comparison

in an

Intensive and Non-Intensive Breeding System *

	Group A	Group B
No. of Litters Born	286	158
No. of Kits Born	2453	1366
No. Born Alive	2238	1275
Mortality %	8.8	6.7
No. at 21 days	1733	1028
Mortality %	22.6	19.4
No. at 56 days	1636	994
Mortality %	5.6	3.3
Total No. Dead	817	372
% Dead	33.3	27.2

Group A - Intensive

Group B - Nonintensive

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TABLE V
Weaned and Nonweaned
Rabbit Fryers
Utilizing the Same Diet

	Group A	Group B
Number of Rabbits	243	159
Average Litter No. at 56 days	6.4(.28)	6.9(.40)
Average Weight (grams) 56 days	1412(33.9)	1592(35.4)*
Mortality		
No. Dead	47	10
%	19.3	6.3

Group A - Weaned
Group B - Nonweaned

Parenthesis contain standard error of the mean
*Statistically significant (p<01)

TABLE VI

Postpartum Breed Back

VS

Economics of 42 Day Breed Back

	Group A	Group B	Group C
Doe Cages	30	30	60
Fryer Cages	30		
Litters Reaching Market Weight	242	138	276
Total Fryers to Market	1636	994	1988
Income ($3.50/fryer)	$5726	$3479	$6958
Additional Expenses			
Extra Feed for 352 fryers			$361
Increased cost for Doe Feed fed to all fryers		$43	$ 86
Additional Income due to weight gain of fryers		$186	$372
Total Income Minus Additional Exp.	$5726	$3622	$6883

Group A - Intensive

Group B - Nonintensive

Group C - Theoretical