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SPRING PEAS AS A SOURCE OF PROTEIN FOR DOE RABBITS

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Incorporating spring or winter peas at a high rate (more than 30%) in diets for fattening rabbits presents no problems. The results obtained from numerous trials (FRANCK et al., 1978, SEROUX, 1984) are comparable to those obtained with soya cake.

There are few references for breeding rabbits. One trial which was carried out by the I.N.R.A. (FRANCK et al., 1978) did not reveal any toxic effect when peas were used in the diet. A diet containing 40% FRIMAS peas was compared to a commercial isoprotein diet for 4 months. However breeding results were slighty lower. During an 18 month trial which was carried out by ITCF (SEROUX, 1987), using 2 batches of 54 does, the annual renewal of the livestock was for more important when the diet contained 21% peas than with the diet without peas (166% as opposed to 109%). The winter pea FRIMAS which was used for the first 4 months of this trial may have been responsible for the does disappearing after their first or second dropping (was it because of antinutrional factors being present or a lack of amino-acids in the diet ?). It therefore seemed necessary to set up a long term trial with AMINO spring peas before considering using it in breeding rabbits diets.

I - MATERIALS AND METHODS

The experiment was carried out from January 1984 to may 1985 at the experimental rabbit hutches I.T.C.F. - I.T.A.V.I. at Boigneville (Essonne).

1. The animals

90 crossbred SOLAF rabbits aged 85 days were divided into two batches depending on their origins, the size and weight of their birth litter, as well as their live weight when being divided into batches.

During the trial 84 and 76 does respectively for batch 1 and 2 replaced the dead or eliminated does. These were divided using the same criteria as above. Altogether batch 1 received 129 does and batch 2, 121 does all of which gave birth at least once.

2. Feedstuffs

a) Basic ingredients

Table 1 shows an analysis of the basic ingredients which were used in diets. The AMINO pea has almost the same composition as that of the spring pea in the Tables (INRA 1984, ITCF-ITP 1986).

Basic ingredients	Crude protein Nx6,25	Crude fiber Weende	Lipids	Lysin (1)	Méthio. + cyst. (1)	Trypto-phan (1)	Thréo-nine (1)	Ca	P	K (2)
Wheat (Talent 83)	135	30	23	3,7	5,3	1,5	3,9	0,7	3,8	4
Oats	100	135	52	4,6	5,6	1,4	3,9	1,2	3,8	4
Peas (AMINO 83)	243	55	17	18,1	6,1	2,0	9,4	2,9	5,6	12
Soya cake 50	550	37	12	34,4	16,3	7,1	21,1	3,0	8,0	20
Dehydrated lucerne	168	303	25	7,1	4,6	2,9	6,9	18,2	2,2	24
Straw (treated 2,3% NaOH)	38	414	-	-	-	-	-	3,8	1,0	10

(1) Estimations from INRA equations in "Feeding Pigs" ITCF-ITP, 1986.
(2) NRC Tables.

TABLE 1. Chemical composition of the basic ingredients (g/kg MS)

b) The diets

The two diets were formulated to contain the same quantity of protein (198 g/kg MS) and crude fiber (139 g/kg MS) (Table 2). In order to obtain this, the pea is incorporated into the diet, following the formula :

21 peas = 12 wheat + 3 oats + 6 soya cake.

DIET	1	2
Wheat	34	22
Oats	14	11
Spring peas	-	21
Soya cake	18	12
Dehydrated lucerne	22	22
Straw	9	9
Minerals + vitamins	3	3
Total crude protein content	202	202
Cellulose Weende	135	138
Lipids	22	21
Lysine	9,6	10,7
Methionine + Cystine	8,4	7,9
Tryptophan	2,6	2,4
Threonine	7,1	7,2
Calcium	14,5	14,5
Phosphorus	8,7	10,2
Potassium	11,6	12,3

Table 2 - Composition of the diets (% diet to 87% MS) and chemical composition (g/kg MS).

The two diets have similar characteristics when analysed (8 analyses per diet) and conform to the forecast made : 202 g protein per kg MS and 135 and 138 g crude fiber/kg MS.

The correct amount of amino acids (lysine, methionine + cystine, tryptophan and threonine) were found. DL-Methionine was added to the two diets by using a vitamin mineral supplement (2 g/kg MS

feedstuff). The supply of calcium and phosphorous in these diets was slightly higher than the recommanded dosage (LEBAS et al., 1984).

The two feedstuffs were made at I.T.C.F. every 3 months in 4 mm diameter pellets. A fodder analysis was carried out each time (DM, CP, CF, lipids, Ca and P) except for the amino acids which were analysed only the first time.

3. Running the trial and controls

The first 45 does in each batch began the trial in six groups of 7 or 8 during the first six weeks of the trial which lasted 69 weeks. The does were brought into the trial for renewal as needed at their first mating. All the does were sorted at 85 days old, and received one of the 2 diets from this age. When first mating the does were 138 days old (± 6,4 days) their mean weight was 3570 g (± 305 g) in batch 1 and 3530 g (± 443 g) in batch 2. The does were mated 10 days after dropping their young which were weaned at 29 days old. The number of young rabbits were controlled every day from birth to weaning. After a doe had dropped her young, these could be transferred from one doe to another so long as they had the same diet and had dropped young the same number of litters. The litter was weighed when weaned. The food intake was recorded once a week. The female rabbits were in separate cages as from the age of 85 days. They received a daily ration of 200 g of food up until 4 days before dropping their young. Then the nursing does were fed ad libitum and the non-nursing does were rationed to 130 g of food per day until, as usual, 4 days before dropping their young. The buck rabbits were rationed to 130 g control food without peas.

4. Statistical analysis

The effect of the pea was studied by using the variance analysis for prolificness, the interval between births, the number of live births per viable birth and weaned young per weaned litter, the mean weight of the weaned young, intake per weaned young rabbit and the rate of consumption. The Pearson Khi-2 test was used for the other criteria : rate of acceptance and fertility, number of births per rabbit, death rate and reduction in the livestock.

II - RESULTS AND DISCUSSION

1. Does intake

The does daily intake was the same for both the diets (table 3). The addition of peas scarcely affected the does'intake. During the 3 weeks after dropping, the average daily intake was 394 g for batch 1 and 388 g for batch 2 (- 1,5%).

In the 4 th week it was 573 g and 579 g respectively with, on average, 8.2 and 8.4 young rabbits per litter.

When the intake given to the doe and her young was then given to the weaned rabbit, the diet containing peas was definitely eaten less (- 82 g per young rabbit).

This 4,4% deviation can be explained by the greater number of weaned rabbits (+ 0,2 young rabbits), a lower death rate at birth to weaning (- 1,7 points) and the weaned rabbits lighter weight (- 1,1%) in the batch receiving peas.

DIET	1	2
From weaning to giving birth (batch 1 = 23 days, batch 2 = 22 days)	133	132
From giving birth to weaning		
Week 1	408	394
" 2	380	382
" 3	396	389
" 4	573	579
From 1 weaning to the next	287	289

Table 3 - Mean Daily intake of the female rabbits per period (g of feed at 87% MS).

2 - Reproduction performance data.

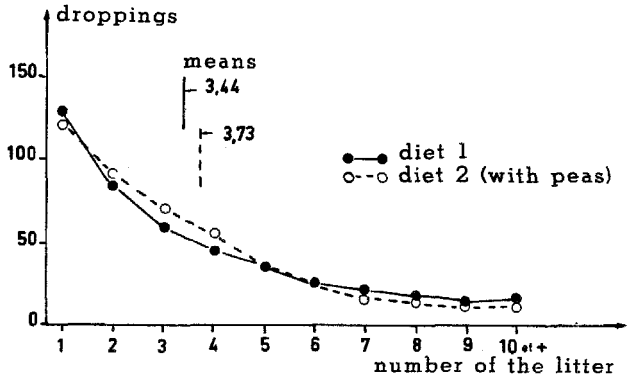
During the trial the does were presented 700 times to the male in batch 1 (without peas), with 256 refusals. In batch 2 (with peas) 235 refusals where noted out of 686 presentations. The difference between the 2 batches, 36,5% refusal versus 34,2%, slighty favoured the batch receiving spring peas. On the other hand the proportion of droppings in relation to matings was higher in the control batch (82% to 80%). Finally 1,58 and 1,52 presentations were needed for 1 dropping in the batches with or without peas

Diet	1	2	CV residual	Probability
Percentage of AMINO peas	0	21	(%)	α=0,05
Number of "breeding" cages	45	45	-	-
" of does entered	129	121	-	-
" of births	444	451	-	-
Acceptance rate (mating/presentation) (%)	63,56	65,8	-	0,21
Fertility rate (births/coverings) (%)	81,9	79,8	-	0,14
Prolificness (live births/births)	9,34	9,45	11,9	NS
Interval between births	53,1	51,8	12,9	NS
Number of births per doe	3,44	3,73	-	NS
Number of viable births per doe	3,39	3,65	-	0,20
Number of weanings per doe	3,33	3,50	-	0,21
Number of live births per viable birth	9,5	9,6	10,3	0,35
Number of weaned per weaned litter	8,2	8,4	11,0	0,07
Dead births (%)	7,2	8,1	-	NS
Deaths birth-weaning (%)	14,7	13,0	-	NS
Number of weaned rabbits / cage / year	59,0	60,7	-	-
Mean weight of weaned rabbit (g)	611	604	5,6	0,32
Weaned rabbits intake (g)	1863	1781	10,8	0,01
1 / Feed efficiency	3,05	2,95	12,9	NS
Reduction in livestock (% per year)	141	128	-	NS

Table 4 - Reproduction performances (69 weeks).

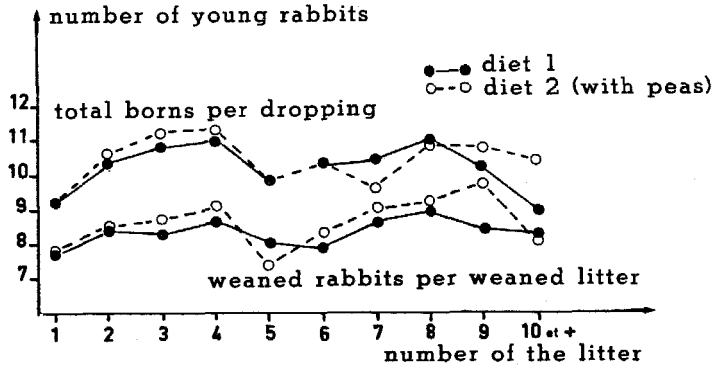
The interval between droppings was similar in both batches - 53,1 (± 13.4) and 51.8 (± 20) days : The minimum deviation was 42 days when the mating witch fertilized the doe took place 10 days after the female dropped her young.

The number of total and viable droppings and litters weaned by the doe were very slightly higher in batch 2 (non significant). This is because of the higher number of does which had only dropped young once or twice in batch 1 (45 and 26) compared to batch 2 (30 and 21). In fact the reduction in the livestock took place more rapidly in the control batch during the first two cycles. 44% and 58% of the does in each batch weaned three litters or more. After the third litter, the rate of elimination was comparable in the 2 batches (graph 1).



Graph 1 : Evolution in the number of births as a function of the litter number

The total numbers of young rabbits per birth and of live births following a viable dropping were very close in the 2 batches (graph 2) 0.7 or 0.8 young rabbit were bour dead out of 10,2 births. 1.4 young rabbits per letter would die between then birth and weaning (table 5). The total death rate was identical in both batches (21,9 and 21,1%). The number weaned per weaned litter was slightly higher in the batch feeding on peas (+ 0,2 young).



Graph 2 : Evolution in the number of young rabbits born and weaned as a function of the number of the litter.

DIET		1	2
Total number of rabbits per birth		10,06	10,29
Number of still-born rabbits		0,72	0,83
Dead rabbits	0 - 7 days	0,72	0,70
	8 - 14 days	0,30	0,29
	15 - 21 days	0,19	0,20
	22 - 28 days	0,22	0,25
Nb of weaned rabbits per birth		7,91	8,02

Table 5 - Still-births and deaths occuring between birth and weaning.

The number of rabbits weaned per cage and per year was higher in the batch receiving peas (60,7 as opposed to 59,0). This was not an insignificant deviation even if it was due to an addition of minimum advantages in this batch, such as the number of weanings per doe and the number of weaned rabbits per litter. The mean weight of the weaned litter was slightly higher in the batch receiving peas (5,07 kg as opposed to 4,99 kg). The deviation of 1,6% could be explained by the higher number of weaned rabbits (+ 0,2) which was not cancelled out by a slightly lighter mean weight of the weaned rabbits (- 7 g).

CONCLUSION

If the spring pea is incorporated into doe rabbits' diet at a rate of 21%, it has a slightly positive effect on breeding performances, especially when considering longevity and the number of young rabbits weaned per litter. The results of this long term trial (16 months) are based on 430 weaned litters per diet and allow us to affirm that incorporating spring peas into a breeding rabbits' diet is possible. This practice is economically interesting when one profits from financial aid from the community if using proteins.

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SUMMARY

SPRING PEAS AS A SOURCE OF PROTEIN IN DIETS FOR DOE RABBITS
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When spring peas replace soya cake and cereal by 21 % in diets for doe rabbits, good results are obtained when breeding : 1,7 more young rabbits are weaned per cage per year and does live slightly longer (on average 3,7 as opposed to 3,4 births).

The trial lasted 16 months, during which 250 cross-bred rabitts (SOLAF) had 860 litters. The control diet was composed by cereals, soya cake, dehydrated lucerne, straw, minerals and vitamins. It contained per kilo of dried matter 200 g of crude protein and 135 g of Weende cellulose.

In the experimental diet 21 % of spring peas (AMINO) were introduced so as to retain the same chemical characteristics (21 % peas = 12 % wheat + 3 oats + 6 soya cake). Both diets were fed as pellets. The food was given ad libitum when the does were nursing their young and rationed to 130 g per day for the rest of the time.

LE POIS DE PRINTEMPS, SOURCE DE PROTEINES POUR LES LAPINES REPRODUCTRICES

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Le pois de printemps, incorporé au taux de 21 % dans un aliment pour mères lapines, en substitution à une partie du tourteau de soja et des céréales, a un effet favorable sur leurs performances de reproduction : En particulier on sèvre 1,7 lapereaux de plus par cage et par an et la longévité des femmelles est légèrement meilleure (en moyenne 3,7 contre 3,4 mises-bas).

L'essai a duré 16 mois pendant lesquels 250 lapines hybrides (SOLAF) ont réalisé 860 portées. L'aliment témoin est constitué de céréales, de tourteau de soja, de luzerne deshydratée, de paille et de minéraux et vitami-nes. Il contient, par kg de matière sèche, 200 g de matières azotées totales et 135 g de cellulose brute.

Dans l'aliment expérimental 21 % de pois de printemps (AMINO) sont introduits de façon à conserver les mêmes caractéristiques chimiques (21 pois = 12 blé + 3 avoine + 6 tourteau de soja). Les deux aliments sont présentés en granulés. Les lapines sont alimentées à volonté lorsqu'elles sont allaitantes et rationnées à 130 g d'aliment par jour le reste du temps.