

**FIRST ATTEMPT TO STUDY CHICK-PEAS UTILIZATION
IN GROWING RABBITS FEEDING**

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The classical main utilization of chick-peas is human consumption ; but recently, a selection has been started in south of France to obtain new lines with high per hectare production, specially for animal feeding. In this way, chick-peas are interesting in proteins providing (25 to 30 % of dry matter) and energy supplying because of a low fiber content (3 to 6 % of dry matter).

The object of the present short experiment is to study 2 chick-peas strains, during selection program, in their ability to be introduced in rabbit feeding. The 2 lines are one with medium to low (L) protein concentration (22.5 %) and a second (H) with a high level (26.2 %).

MATERIAL AND METHODS

The composition of the 2 chick-peas lines is demonstrated on tables 1 and 2. The samples have been obtained from the selection firm UCSS (B.P. 2, 26160 La Batie Rolland, France) working in the south of the Rhône Valley. The selection reference of the L line was UC-51 and UC-103 for the H line. As it can be seen on table 2, for growing rabbits chick-pea's proteins are deficient for sulfur amino acid (- 10 % or - 24 % of requirements) and for threonine (- 13 % to - 19 %), according to french recommendations (INRA, 1984). In other hand, lysine and arginine are abundant.

TABLE 1
Chemical composition of the 2 chick-peas lines

<u>Analysis</u>	Line L	Line H
- Dry matter	89.4	89.7
- Crude proteins	22.5	26.2
- Crude fiber	2.9	3.1
- Minerals	3.5	3.0
<u>Estimated composition</u>		
- Lipids		4.5
- Calcium		0.08
- Phosphorus		0.50

TABLE 2

Essential aminoacids composition of chick-peas proteins
in comparison with rabbit's requirements (g/16 g N)

(crude proteins)	Chick-pea lines		Rabbit's requirement (INRA, 1984) (16 %)
	L (22.5 %)	H (26.2 %)	
- Lysine	6.44	6.11	4.06
- Methio + cystine	3.37	2.86	3.75
- Tryptophan	0.98	0.61	0.81
- Threonine	2.99	2.79	3.44
- Leucine	7.11	6.87	5.66
- Isoleucine	4.13	4.01	3.75
- Valine	4.67	4.58	4.38
- Histidine	2.35	2.40	2.19
- Phenyl. + tyrosine	7.77	7.63	7.50
- Arginine	9.33	11.26	5.63

The 2 lines were incorporated at 10 % or 20 % level in balanced rabbit's pelleted diets (table 3) to be compared to a control diet without chick-pea. The substitution formula for each of the lines are hereafter :

10 L chick-pea = 6.8 wheat + 3.2 soya oil meal

10 H chick-pea = 5.7 wheat + 4.3 soya oil meal.

Hundred 30 day old Newzealand White rabbits of both sexes were divided in 5 homogenous groups according to the individual weight and genetic origin (litter). They were placed individually in wire mesh cages with automatic watering. They received ad libitum for 6 weeks, one of the 5 experimental diets. In addition, 5 groups of 5 rabbits of the same origine were placed in collective digestibility cages for a rapid digestibility study (1 data/diet) of 2 weeks after 2 weeks of habituation

Mathematical analysis was made with the statistical package SAS/STAT of the SAS company employed on a Logabax 1600 S microcomputer (factorial variance analysis of unbalanced groups).

TABLE 3
Diet's composition

Formula	CONTROL	Chick-pea diets			
		L 10	L 20	H 10	H 20
- Chick-pea L	-	10	20	-	-
- Chick-pea H	-	-	-	10	20
- Wheat	23.0	16.3	9.6	17.3	11.6
- Soya oil meal	8.6	5.4	2.2	4.3	-
- Alfalfa dehydrated	20	20	20	20	20
- Wheat straw	10	10	10	10	10
- Barley	10	10	10	10	10
- Wheat bran	15	15	15	15	15
- Sunflower oil meal	9.5	9.5	9.5	9.5	9.5
- Minerals and vitamins	1.5	1.5	1.5	1.5	1.5
- Dicalcium phosphate	1.760	1.720	1.670	1.740	1.720
- Calcium carbonate	0.530	0.510	0.500	0.565	0.600
- dl methionine	0.030	0.030	0.030	0.040	0.050
- l lysine	0.080	0.040	-	0.055	0.030
Composition (% DM)					
- Dry matter %	89.7	90.3	90.0	90.2	90.2
- Organic matter %	91.1	91.2	90.8	91.2	91.1
- Crude proteins %	19.6	19.5	19.9	19.1	19.6
- Gross energy kcal/g	2.63	2.58	2.66	2.54	2.73
- Crude fiber %	16.8	16.8	16.9	17.4	17.7

RESULTS AND DISCUSSION

During the experiment, mortality rate was low : 3 out 100 rabbits (1 in group L20 on the 4th day of experiment and 2 in the H20 group on days 11 and 25).

Digestibility of organic matter and of energy were not affected by the type of diet ; on the other hand, nitrogen digestibility was high for the control and reduced after "H" chick-pea introduction, but without consideration of the percentage (table 4). Nitrogen digestibility of low proteins chick-pea diets is similar to that of the control.

Growth and feed intake performances of rabbits were not affected by the diets (table 4). Only a slight, but not significant, growth rate reduction can be observed with 20 % of the H line chick-pea. This lower performance was confirmed by the significantly greater expense of digestible energy needed to obtain 1 g of weight gain : 7.86 kcal in H20 group vs 7.17 to 7.49 for the other 4 groups (table 4). This may be due to the limiting level of threonine in the H20 diet (BERCHICHE, 1985).

Additional statistical variance analysis of growth rate, feed intake and feed efficiency failed to establish any significant effect of the chick-pea introduction level or of the line of chick-pea.

The conclusion of this first experiment is that introduction of chick-pea in rabbit's diets, does not induce any great disturbance. The energetic value of chick-peas is high, between wheat and soya meal i.e. about 3100-3200 kcal/kg ; but the nitrogen digestibility is moderate, about 70 %, for high protein chick-pea and higher (82 %) for low protein chick-pea. This mediteranean proteaginous seed is probably a promising raw material for rabbit feeding. The actual potentiality of production in farms is 2.5 to 3.0 tonnes/hectare and the main object of the selection is to increase this production up to 4 or 5 tonnes/ha, in a few years.

TABLE 4

Digestibility and growth results obtained with chick-peas experimental diets

	CONTROL	Chick-peas diets				CV % (1)	Statistical significance
		L 10	L 20	H 10	H 20		
<u>Digestibility (%)</u>							
- Organic matter	63.3	62.8	63.3	61.8	63.3	-	-
- Nitrogen	73.4	73.0	75.4	69.3	69.7	-	-
- Energy	61.7	60.4	61.9	59.4	62.5	-	-
- Crude fiber	13.8	15.6	19.5	12.6	19.5	-	-
<u>Growth performances</u>							
- Initial weight g	663	667	674	661	668	1.7	NS
- Final weight g	2304	2337	2323	2297	2257	6.3	NS
- Food daily intake g	121	125	123	121	121	8.1	NS
- Weight daily gain g	39.1	39.7	39.3	39.0	37.8	8.7	NS
- Feed conversion ratio	3.09	3.14	3.13	3.12	3.19	6.1	NS
- Kcal D.Energy/g weight gain	7.28a	7.32a	7.49a	7.17a	7.86b	6.0	P<0.001

CV % = residual coefficient of variation after variance analysis.

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Two lines of chick-peas, selected for animal nutrition, have been introduced at 0 % - 10 % or 20 % in complete pelleted diets for growing rabbits. The 5 diets were distributed ad libitum for 6 weeks to 30 day old rabbits, caged individually (20 per group). The average growth daily gain was high - 39.0 g/day - without differences between diets. The only difference was a greater amount of digestible energy needed for 1 g of weight gain with 20 % of the second line of chick-pea (26.2 % proteins) : 7.86 kcal ED/g vs 7.17 to 7.49 for the 4 other experimental diets, including the 2 diets with the first chick-pea line (22.5 % proteins). Digestibility study of the 5 diets indicates a high digestible energy concentration for chick-pea : 3100-3200 kcal/kg and a moderate to high digestibility of proteins : 70 to 82 p.100. No special problems of mortality have been observed : 3 died rabbits out of 100.

**PREMIER ESSAI D'UTILISATION DU POIS CHICHE
DANS L'ALIMENTATION DU LAPIN EN CROISSANCE**

Lebas F.

Deux lignées de pois chiche en cours de sélection pour l'utilisation en nutrition animale, ont été introduites à 0 % - 10 % ou 20 % dans des aliments complets granulés pour lapins en croissance. Les 5 aliments ont été distribués à volonté pendant 6 semaines à des lapereaux de 30 jours au départ, logés en cages individuelles (20/lot). La vitesse de croissance a été élevée sur l'ensemble de l'expérience (39,0 g/j), sans différence significative entre lots. La seule différence a été observée pour la quantité d'énergie digestible ingérée nécessaire pour obtenir 1 g de gain de poids avec le lot contenant 20 % du pois chiche riche en protéines (26,2 %) : 7,86 kcal ED/g vs 7,17 à 7,49 pour les 4 autres aliments, y compris ceux contenant 10 ou 20 % de l'autre lignée de pois chiche plus pauvre en protéines (22,5 %). L'étude rapide de digestibilité des 5 aliments indique pour le pois chiche une forte teneur en énergie digestible : 3100 à 3200 kcal ED/kg, et une digestibilité modérée à forte des protéines : 70 à 82 %. Aucune mortalité particulière n'a été observée : perte de 3 lapins sur 100.