

## Technico-economic Analysis of the Substitution of Maize by Barley in the Flesh Chicken Food

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**Abstract:** The development of the various breedings of which poultry farming, depends primarily supplies food answering the criteria quantitative and qualitative. However, it is that this food is composed of imported raw materials in their great majority with heading the maize. The experimentation carried out on various batches of nourished chicks with a compound feedingstuff, comprising variable amounts of imported maize and of barley produces locally is highlighted. The obtained results show that the barley can be the subject of substitute product to imported maize thus it is encouraging as well on the technical plan as on the economic plan. A substitution to rates of 25 and 50% gave a growth who was close to that pilot batch which comprised only maize. On the other hand, a substitution for rates of 75 and 100% generated a less advantageous growth for the barley.

**Key words:** Substitution, proteins animal, production costs, breeding cycle, food mode, technical performance, system of production, added-value

### INTRODUCTION

The food intake of Algerian is regarded as sufficient from the energy view point because of its increased consumption in cereal products (bread, couscous, legs, cakes, etc). It is on the other hand low in animal proteins because it contains approximately only 11-12 g day<sup>-1</sup>. This animal protein deficit tends to accelerate and to worsen with the demographic explosion and the degradation of the purchasing power of the great majority of the Algerian households (Boudina, 1990).

As possible solution with this phenomenon of malnutrition, there is the development of the industrial poultry farming, which is able to provide in the short run, the quantity proteins at a cheap for the many households with low-income. It should be underlined with the passage that the red meats offered into weak quantities, cost excessively expensive and are not with the range of all the households.

These great quantities of raw materials coming from a minority of country having the monopoly of the production and marketing, weigh heavily on the external balance, which constitutes one handicaps for the nation's economy (Ouinas, 1998). This situation of dependence gives us an idea of the brittleness of our avicolous livestock and shows us how much this one is vulnerable. The development of our livestock is conditioned by the increased imports of corn and other food. However, it is noted that the invoices of the inputs are increasingly heavy, because their prices tend to evolve as a function

of the offer and of the request and according to the oil prices which always have upward trend (Dahmane, 1995). To put an end to this puncture of the Treasury and to ensure certain independence with regard to the usual suppliers, it is advisable to find products local for a better substitution.

For that Algeria has a cereal range whose barley could play a paramount role in the avicolous livestock food. However, the barley production at present is insufficient to meet the national needs because of realized weak outputs carried out which is the consequence of the absence of non control of the farming techniques (Samadj, 1995).

In the cereal countries the barley yield exceeds the bar of 30 quintals to the ha, whereas in Algeria the average of the outputs turns around 10 q ha<sup>-1</sup>. The control of the farming techniques will make it possible to double and to even triple the current output, which will ensure national self-sufficiency. It is announced that the tests carried out in the zones with cereal vocation and in particular with Ain El-Hadjar (Saida) in Setif on the variety Saida 83 and at Oued Smar (Algiers) gave satisfactory results. The outputs in these stations turned to the turn of 50q ha<sup>-1</sup> (Haichour, 1989).

Also, massive corn imports, of soya bean oil cake and other raw materials are heavy consequences for the Algerian economy with the profit of the imports which generate an added-value for the countries agriculture which have the export monopoly of these raw materials. At the national level, the problem of the imports has

Table1: Percentage of the imported raw materials and the local products in the food composition of cattle. Case of the UAB of Mostaganem

Year	2003		2004		2005		2006	
RM	Q(tonne)	%	Q(tonne)	%	Q(tonne)	%	Q(tonne)	%
IRM	42781.08	85.6	38150.30	87.05	29605.125	86.85	28921.248	87.5
LRM	7195.20	14.4	5673.98	12.45	4482.22	13.51	416138	12.5
Total	49976.28	100	43824.285	100	34089.348	100	336061	100

RM: Raw materials; IRM: Imported Raw materials; LRM: Local raw materials; Q: Quantity in ton

effects on the economic and policy plans. The massive imports contribute to the deficit of the trade balance and generate dependence more and more increased with respect to the supplying countries. The important sums devoted to the payment of the imports can be devoted to the development financing of agriculture and consequently of the development of avicolous breeding (Haichour, 1989).

The stockbreeders, who have the obsession of the rupture of their stock because of the frequent food shortages on the market at certain periods of the year, tend to constitute important food stocks to escape this risk. However, this way of managing the shortage comprises several disadvantages, of which the immobilization of the capital, the deterioration of the quality of medium-term food and the losses which are due to the bad conditions of storage. Percentage of food made up in the avicolous livestock food reached 90%, as it is the case of the UAB of Mostaganem (Ouinass, 2003).

It is noted that the through the data of (Table 1), the local production covers only one small percentage of the needs of food for the livestock, the remainder is made up exclusively of imported raw materials (87.50% in 2003 and 2006). This situation indicates to us the degree of dependence as regards food of our livestock with respect to the foreign suppliers.

## MATERIALS AND METHODS

The experimentation was carried out on a sample made up of an about 60 chicks throughout one 56 days duration. This livestock was divided into 5 batches of which a pilot and nourished batch of a food which comprised variable amounts of barley and maize. With each batch of chicks corresponds a specific food mode; the distributed modes were as follows:

$M_{100} B_{00}$ ,  $M_{75} B_{25}$ ,  $M_{50} B_{50}$ ,  $M_{25} B_{75}$ ,  $M_{00} B_{100}$  (M: mazie et B: barley)

Dans ces expérimentations les taux de substitution du maïs par l'orge ont été inversement proportionnels et comme suit:

Batch pilot	$M_{100} B_{00}$	mean	100% of maize and 0% of barley
Batch 1	$M_{75} B_{25}$	mean	75% of maize and 25% of barley
Batch 2	$M_{50} B_{50}$	mean	50% of maize and 50% of barley
Batch 3	$M_{25} B_{75}$	mean	25% of maize and 75% of barley
Batch 4	$M_{00} B_{100}$	mean	0% of maize and 100% of barley

Table 2: Composition of food distributed to the various batches (in %)

Modes RM	$M_{100} B_{00}$	$M_{75} B_{25}$	$M_{50} B_{50}$	$M_{25} B_{75}$	$M_{00} B_{100}$
Maize	64.70	48.525	32.35	16.175	00.00
Barley	00.00	16.175	32.35	48.525	64.70
OCS	32.00	32.000	32.00	32.00	32.00
VMC	3.30	3.300	3.30	3.30	3.30
Total	100.00	100.000	100.00	100.00	100.00

RM: Raw materials; OCS: Oil cake of soya, VMC: vitaminized mineral complement

The objective of this experiment is to study the impact of food distributed on the growth of the subjects of each batch, then to evaluate the cost of consumed food and finally of account to measure the economic profitability of the aforesaid substitution (Table 2).

Two parameters are to be taken into account for each batch made up, initially the influence of the food mode received on the growth, then the cost of the distributed food.

## RESULTS AND DISCUSSION

**Influence of the substitution on the growth:** The results concerning the profit of weight per batch during the experimental period were consigned in the Table 3. The subjects of the various batches recorded an unequal growth during the breeding cycle. The weight gain of the subjects of the pilot batch whose maize was the principal element in the composition of consumed food classifies at the head, in comparison with the other batches and this during the first and the second phase.

During phase III, on the other hand we noted the opposite phenomenon. The subject's growth of the batches  $M_{75} B_{25}$  and  $M_{50} B_{50}$  where the barley was incorporated on the 25 and 50% rates was better in comparison with that of the pilot batch subjects.

Finally, during 7 and 8th week of experimentation, the substitution of maize by the barley gave satisfactory results. The growth of the subjects nourished with food containing at the same time barley and but was by far better than that of the subjects of the pilot batch which had received like basic food only maize.

**Study of the costs of the various distributed modes:** The study of the costs of food consumed by subject pertaining to various batches requires:

- To make the evaluation of the quantities of matters introduced by subject and phase for the various modes.
- To calculate the cost of food introduced by subject for the period of experimentation.
- The other factors returning in the calculation of the costs in particular the labor, energy, water, the damping of the buildings were neglected voluntarily because they are common to all the subjects.

The results to which we ended concerning the costs of food distributed during the substitution of maize by the barley to progressive rates are shown in Table 4.

The analysis of these results indicate to us that the costs of food introduced by the subjects of the various batches records a downward trend as the rates of substitution of maize by the barley increase. Thus during phase I, the cost of consumed food passed from 7.69 DA for the pilot batch  $M_{100} B_{00}$  to 5.59 DA for the batch  $M_{00} B_{100}$  for which the distributed food intake did not comprise a maize.

During phase II, one notices the same downward trend of the costs of distributed food; this fall is parallel to done the increase in the substitution rates. Thus one passed from a cost of 54.87 DA/subject to 33.41 DA, that is to say a reduction of the food cost per subject of 21.46 DA. As regards phase III, the distributed costs food recorded a downward trend in comparison with the pilot batch cost. The gain recorded by subject nourished with made up food containing barley, is of 8.9 DA.

**Comparison of the costs for various modes:** According to, the obtained results, one notices that the substitution of maize by the barley at various rates: 25, 50, 75 and 100%, in the food composition of chicken involves a reduction in the costs which is made with the advantage barley. The cost of consumed food by subject pertaining to the pilot batch was 95.64 DA whereas it is only of 63.47

DA for a subject pertaining to batch  $M_{00} B_{100}$ , what gives a gain of 32.17 DA/subject. In the production costs of flesh chicken, the food represents the essential component and generates the most important load. For the producer, a loads reduction of food means production of chicken at weak cost, which enables him to box a substantial margin. The variations of food costs distributed on the various batches are shown in Table 5.

**Evaluation of the weight of the various batches:** A better growth generated by the consumption of a given food, confers on this food an unquestionable advantage, on the remainder of food used. In our case, the incorporation of the barley in food of chicken at constant rates in substitution for maize, generated a variable growth of a batch to another. Evolution of this growth per batch on the three phases at summer are shown in Table 6.

The subjects of the pilot batch which had received a food containing maize, were distinguished from the subjects of the other batches by a slightly higher growth during phases I and II. On the other hand, during phase III one notes a better performance at the subjects which

Table 3: Gain of weight of the various experimental batches (weight in g)

Modes RM	$M_{100} B_{00}$	$M_{75} B_{25}$	$M_{50} B_{50}$	$M_{25} B_{75}$	$M_{00} B_{100}$
Week 1	91.10	80.24	74.28	71.07	67.90
Week 2	199.31	175.93	164.31	154.52	129.88
Phase I	290.41	256.17	238.59	225.59	197.28
Week 3	267.66	217.10	210.45	221.66	185.34
Week 4	392.34	367.83	367.97	305.48	241.41
Week e 5	464.55	428.28	440.69	361.38	265.45
Week 6	465.21	429.55	39093.00	365.41	314.24
Phase II	1589.76	1442.76	1410.03	1253.93	1006.44
Week 7	432.07	452.07	445.00	421.48	352.34
Week 8	353.28	465.86	445.69	450.34	409.97
Phase III	785.35	917.93	890.69	871.82	762.31

Table 4: Cost of food by phase and mode (in DA)

Modes phase	$M_{100} B_{00}$	$M_{75} B_{25}$	$M_{50} B_{50}$	$M_{25} B_{75}$	$M_{00} B_{100}$
1st phase	7.69	6.99	6.81	6.59	5.59
2nd phase	54.87	50.92	47.06	39.16	33.41
3rd phase	33.08	35.17	32.43	31.48	24.47
Total	95.75	93.09	86.43	77.23	63.47

Table 5: Difference of cost enters the various modes (in DA)

Modes phase	$M_{100} B_{00}$	$M_{75} B_{25}$	Diff.	$M_{50} B_{50}$	Diff.	$M_{25} B_{75}$	Diff.	$M_{00} B_{100}$	Diff.
1st phase	7.69	6.99	+0.70	6.81	+0.88	6.59	+1.10	5.59	+2.10
2nd phase	54.87	50.92	+3.95	47.06	+7.81	39.16	+15.71	33.41	+21.46
3rd phase	33.08	35.17	-2.09	32.43	+0.65	31.48	+1.00	24.47	+8.61
Total	95.64	93.09	+2.55	86.43	+9.21	77.23	+18.41	63.47	+32.17

Table 6: Evolution of the growth by batch and phase

Modes phase	$M_{100} B_{00}$	$M_{75} B_{25}$	Diff.	$M_{50} B_{50}$	Diff.	$M_{25} B_{75}$	Diff.	$M_{00} B_{100}$	Diff.
1st phase	290.41	256.17	-34.24	238.59	-52.17	225.59	-64.82	197.28	-93.13
2nd phase	1589.76	1442.76	-147.00	1410.03	-179.73	1253.93	-335.83	1006.45	-583.31
3rd phase	785.35	917.93	+132.59	890.69	+105.35	871.82	+86.49	762.31	-23.03
Total	2665.52	2616.86	-48-65.00	2539-31.00	-126.55	2351.43	-314.16	1966.04	-699.47

were nourished food containing of the increasing rates of incorporation of barley, this represents an advantage for this local cereal (barley).

### **CONCLUSION**

Results of the experimentation studied show that the barley is the food of choice which can be the subject of substitute product to imported maize. A substitution for rates of 25 and 50% gave a growth which was close to that of the pilot batch which comprised only maize. On the economic plan this substitution had generated a reduction of the cost of food, which with its turn was reflected in a positive way on the production costs of flesh chicken. Another substitution for 75 and 100% rates generated a less advantageous growth for the barley, but a gain on the cost which was evaluated to 32.17 DA per subject.

The barley which is a local product its credit has many advantages which militate in favor of its development. The culture of the barley which adapts to the climate and the ground can be intensified provided that the state grants to him much more attention. The intensification of the cereal system of production is conditioned by the improvement of the farming techniques and the adequate fertilization grounds. This method already proved reliable on the level of the experimental zones (Saida, Sétif, Elkhroub).

The intensification of the cereal cultures in general and the barley in particular will make it possible to reach

a better productivity; this will have as an impact the reduction of the imports of maize and other food, what will increase the independence of the country with respect to the great monopolies, will allow the economies realization in currencies, a creation of added-value by Algerian agriculture and especially regular supply white meats of the consumers at affordable prices.

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