

Studies on the Growthgain of Rats Fed on Rice Diet Adding Buckwheat

by

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白米에 蕎麥粉을 섞은 飼料로 飼育하였을때의
Rat의 Growthgain에 對하여

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Wistar系 흰쥐실험을 casein 對照群, 白米飼料群, 白米 80%에 蕎麥粉 20%를 加한 飼料群, 白米와 蕎麥粉의 窒素 level을 같게한 飼料群으로 하여 各群 6마리씩을 ad libitum方法으로 3週間 飼育하였을 때의 成長結果는 아래와 같다.

白米 80%에 蕎麥粉 20%를 混合한 飼料群은 다른試驗群보다 体重增加率이 가장 좋았다. 이것은 쌀에 雜穀을 적당량 混合함으로써 蛋白質價를 改善할 수 있다는 理論¹⁾을 動物飼育實驗으로서도 잘 立證해 줄 수 있었다.

ABSTRACT

The following is the result of feeding ad libitum the Wistar strain rats (♂) divided into 4 groups-(a) casein group, (b) rice diet group, (c) diet group with a mixture of 80% rice and 20% buckwheat and (d) diet group of equal nitrogen levels of rice and buckwheat. Compared with the control group, the diet group given a mixture of 80% rice and 20% buckwheat put on weight slower, but quicker than the rest two. Particularly after 10 days it was found to gain greater weight. Therefore, the discovery is that as proved by theory such a mixed food with a proportion of 20% buckwheat and 80% rice can improve the protein score even in the experiment of feeding animals.

INTRODUCTION

Considering the nutrition of the Korean people, since the question we are conferred with is the intake of protein, I revealed in my report (1) to tackle the problem for its improvement that I had obtained materials enabling me to raise the chemical score of protein by a proportional mixture of cereals based on the amino acid pattern similarity counted out of a given quantity by the method of micro bio-assay in handling essential amino acids of 10 kinds of food including 7 kinds of cereals 3 kinds of beans. The rice contains little lysine (230mg/Ng) (1) while the buckwheat much (409mg/Ng). (1) So in this research an attempt is made on the ground of that report to take a grasp for the result of the growth of rats for this report by making 4 groups-(a) the casein control group, (b) the rice diet group, (c) the diet group fed 80% rice mixed with 20% buckwheat in which amino acid pattern similarity is most similar to ideal from, and (d) the diet group fed a mixture of rice and buckwheat made

same to nitrogen levels.

MATERIAL AND METHODS

Male weanling rats of the Wistar strain, 21 days old and weighing from 42 to 50 g were fed the basal diet after 10% casein diet for three days. They were then separated into groups of 6 rats each and were housed individually in screened-bottom cages kept in an air-conditioned room maintained at 24°C. with water provided at all time. The average initial weights for the groups in each experiment did not differ by more than 2 g. The test diets were supplied to the rats ad libitum and daily food intakes were recorded and body weights were recorded three times weekly during the twenty-days experimental period. The percentage composition of the 10% casein diet was as follows: Casein, 10.0; sucrose, 40.0; corn starch 40.0; bean oil, 5.0; salt mixture, 4.0; vitamin mixture, 0.85; choline chloride, 0.15. Composition of the test diets was as follows table 1.

Table 1. The Composition of the experimental diet

Constituent	Casein group (C)	Rice group (R)	Rice 80% + buckwheat 20% group(RW)	Nitrogen same levels group (RWS)
Starch	83	—	—	15
Casein	7	—	—	—
Rice	—	90	72	60
Buckwheat	—	—	18	15
Oil	5	5	5	5
* Salt mixture	4	4	4	4
** Vitamin mixture	0.85	0.85	0.85	0.85
Choline chloride	0.15	0.15	0.15	0.15
Total	100.00	100.00	100.00	100.00

* The method of salt mixture was as table 2:

Table 2. The Composition of the salt mixture

Constituent	Amount (mg/100g diet)
CaCO ₃	29.29
CaHPO ₄ ·2H ₂ O	0.43
KH ₂ PO ₄	34.31
NaCl	25.06
MgSO ₄ ·7H ₂ O	9.98
Fe(C ₆ H ₅ O ₇)·6H ₂ O	0.623
CuSO ₄ ·H ₂ O	0.156
MnSO ₄ ·H ₂ O	0.121
ZnCl ₂	0.02
KI	0.0005
(NH ₄) ₂ Mo ₇ O ₂₄ ·4H ₂ O	0.0025

** The method of vitamin mixture was as table 3;

Table 3. The Composition of the vitamin mixture

Constituent	Amount (mg/100g diet)
α-Tocopherol	10.0 mg
Vitamin A	400.0 I. U.
Vitamin D	200.0 I. U.
Thiamin HCl	0.5 mg
Riboflavin	0.5 mg
Nicotinic acid	2.5 mg
Ca-Phanthothenate	2.0 mg
Pyridoxine HCl	0.25 mg
Vitamin K	0.05 mg
Biotin	0.01 mg
Folic acid	0.02 mg
Vitamin B ₁₂	0.002 mg
Inositol	10.0 mg
Ascorbic acid	5.0 mg

RESULTS AND DISCUSSION

Gaining weight

Quantity of intake diet: When raising the 4 groups of rats each on test diet for a period of 3 weeks, their respective intake, as shown in table 4, was 183 g-221 g on an average. also feeding them 9.1 g-11.6 g approf per day.

Table 4. Quantities of intake diet on rats

Diet groups	1	2	3	4	5	6	Average
C-group	232.0	161.5	221.4	240.0	248.0	222.5	220.9
R-group	172.0	185.0	196.3	230.7	239.7	172.7	199.4
RW-group	200.8	172.2	229.0	199.0	212.9	206.0	203.3
RWS-group	163.8	173.7	—	216.8	200.6	188.7	188.7

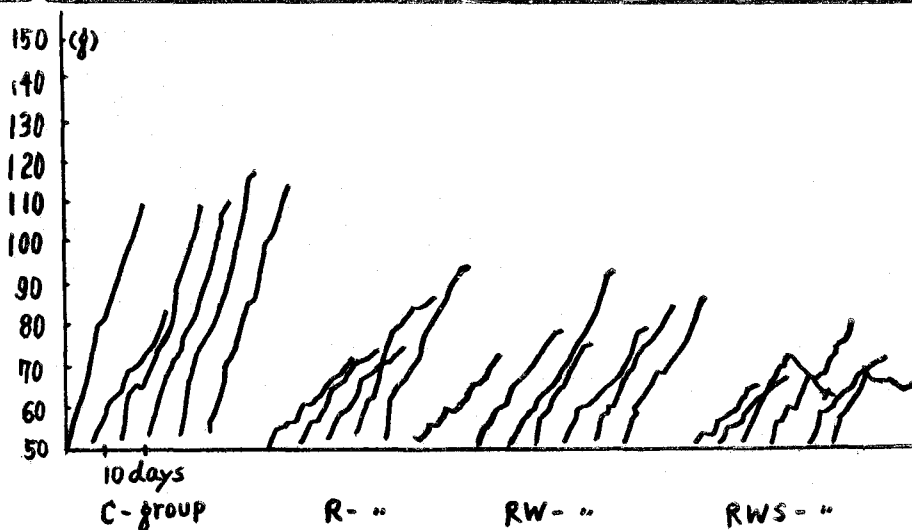


Fig. 1. The Comparison of growth body weight of rats.

Growth gain and weight gain: As in Fig. 1, the degree of each rat's weight is that the control group taking casein 7% diet growth well but the rest 3 groups do not. To make clear the growth of each group, the intention is to show their gaining weight in Fig. 2. As in this Fig. 2, comparing the rice diet group given a mixture of 80% rice and 20% buckwheat (RW) and the diet group fed the same nitrogen levels of rice and buckwheat(RWS) one another, the further RWS group was found slow in growth and the other two administered diet 10 days showed no

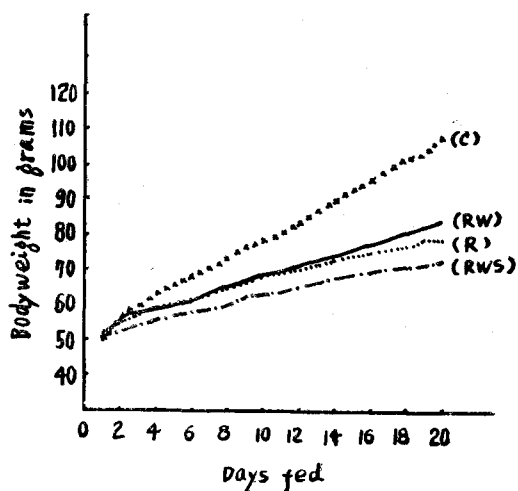


Fig. 2. The average composition of growthgain of rats (g/20 days).

difference in weight gain but 10 days afterwards the RW group eating a 20% mixture of buckwheat gradually put on weight, compared with the rice diet group. Thus, it proves that in our country where the staple food is rice, the question of protein is most controversial for improvement. Growth gain and weight gain were as shown in table 5.

Table 5. Growthgain and weightgain of rats (g or %/20 days)

Gain	C-group		R-group		RW-group		RWS-group	
	ave.	S.e.***	ave.	S.e.	ave.	S.e.	ave.	S.e.
*Growthgain(g)	51.66±4.18		24.67±2.58		28.0 ±1.91		19.5 ±2.22	
Growthgain(%)	191.13±7.33		144.37±3.71		149.43±2.81		136.59±3.34	
**Weightgain (%)	18.99±0.91		12.23±0.56		13.74±0.59		10.24±0.51	

*Growthgain: (Increased body weight/20 days)

**Weightgain: (Increased body weight/100 g diet)

***S.e.: Standard error

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