

## The Effect of Different Types of Litter on Body Weights, Feed Efficiency and Viability of Chicks.

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**T**HIS report deals with the effect of six litter types, confinement and semiconfinement systems of brooding on growth rate, mortality and feed efficiency in chick rearing to 12 weeks of age. A total number of 8349 of Rhode Island Red day old chicks were used. Chicks of two hatches of two hatching seasons were reared on six different types of litter (corn cobs, wood shavings, rice straw, bean straw, sugar cane pulp and wheat straw).

At twelve weeks of age, the highest mean body weight was that of the group reared on rice straw (725 grams), while the lowest was for chicks reared on sugar cane pulp (703 grams). However, there was a highly significant interaction between mean body weight of birds reared on different types of litter under the confinement and semiconfinement systems of rearing.

Under confinement system, the highest mean body weight of 699 grams was on rice straw bedding while the lowest mean body weight of 676 grams was on wheat straw litter. Under the semiconfinement system, the highest body weight (754 grams) and the lowest (722 grams) were those of the groups reared on corn cobs and sugar-cane pulp respectively.

All groups, irrespective of litter used, had higher mean body weights when reared under the confinement system at either 8 or 12 weeks of age.

Neither the use of different types of litter nor the different systems of rearing caused any noticeable difference in feed efficiency.

There is little information available concerning the extent to which different types of litter affect growth and feed efficiency of Chicks.

Blount (1962) found that chicks bedded on feather meal had much improved body weights and feed conversion over chicks on wood shavings. Trail (1963) using four litter types, chopped dried grass and feathers, coffee husk and wood shavings, showed significant differences in chick weights due to types of litter. Feed conversion rates were not significantly

affected. Bearnse *et al.* (1946) and Koutz (1948) reported that mixing hydrated lime into the litter helps in increasing the water loss from the litter and improves the physical consistency of the litter particles. Halbrook (1951) showed that the deep litter management saves labour, litter material and improves hatchability chick growth and livability. Kenard and Chamberlin (1949) found that the old built-up litter lessens the loss of chicks from coccidiosis and other diseases.

Halbrook *et al.* (1950) reported that the fresh litter (as measured by microbiological assay) is very poor in vitamin B<sub>12</sub> content, while built-up litter is very high in it, as the vitamin increases rapidly in litter by use.

This paper reports a trial to investigate the effects of 6 litter types broken corn cobs, wood shavings, rice straw, bean straw, sugar-cane pulp and wheat straw under the confinement and semi-confinement systems of rearing on growth rate, mortality and feed efficiency of Rhode Island Red chicks.

#### Materials and Method

Rhode Island Red Chickens were reared in two double wing brooding houses, each containing 12 pens with concrete floors, six of which having outside dirt yards and the other six were without yards. Kerosene brooders were used in brooding from day of hatch to four weeks of age.

The brooding temperature was 95° F during the first week, and was reduced 5° F every week thereafter.

A practical chick mash and fresh water were available and libitum throughout the experiment.

Two hatches were used per trial in two different hatching seasons as follows :

Seas on of hatch	Date of Hatch	No. of Chicks
First trial . . . . .	19/ 1/1958	5362
	26/ 1/1958	2385
Second trial . . . . .	27/10/1958	1800
	4/12/1958	1700

In each hatch, the chicks were divided into twelve comparable groups. Then, they were randomly distributed to the 12 brooding pens. Six different types of deep litter were used in the confinement and the semiconfinement brooding pens as indicated in the following table.

Pen No.		Litter
Confinement	Semi-confinement	
1	12	Broken corn cobs.
2	11	Wood shavings
3	10	Rice Straw
4	9	Bean Straw
5	8	Sugar cane pulp.
6	7	Wheat Straw

The litter was stirred every other day starting from the second week until the end of the experiment. When needed, the same material was added and the wet litter around the waterers was removed. Hydrated lime was added and stirred well with the litter after the eighth week.

The chicks were weighed weekly. Daily mortality and weekly feed efficiency data were recorded.

The data were subjected to analysis of variance after Snedecor (1956).

#### Results and Discussion

It was generally observed that chicks of the second trial were highly significantly heavier than those of the first (Table 1). These differences in mean body weights between the two seasons were much more pronounced at 12 weeks of age. The first season mean body weights ranged from 640 to 649 grams compared to the second season mean body weights, ranging from 831 to 872 grams. A possible explanation for such differences in mean body weights is the fact that chicks used in the first season trials were taken from a random population in which no intended selection for body size was practiced, while selection pressure for heavier body weights was exerted on the parents of chicks used in the second season trials. Another possible explanation may be due to the higher mortality rate that occurred during the second season due to coccidiosis outbreak, compared to the much lower mortality of the first season.

The highly significant differences that occurred in the body weights between the replications, were to be expected since chicks from different hatches were used.

It should be pointed out that all groups, irrespective of litter used, had higher mean body weights when reared under the semi-confinement system than when reared under the confinement system at either eight or twelve weeks of age (Table 2).

At 4 and 8 weeks of age, the use of different types of litter did not seem to cause significant differences between the mean body weights of the different groups. Thus, it could be stated that, in general, the treatment had no effect on the mean body weight.

TABLE 1. Mean body weights (grams) of Rhode Island red chicks reared on different types of litter at 4, 8 and 12 weeks of age in the two seasons

Treatment	Age in weeks					
	4		8		12	
	Season 1	Season 11	Season 1	Season 11	Season 1	Season 11
Corn cobs . . . .	135	146	353	433	646	837
Wood Shavings . .	138	148	359	429	436	831
Rice Straw . . . .	136	150	333	436	647	853
Bean Straw . . . .	142	153	345	459	644	851
Sugar-cane pulp . .	136	142	343	429	649	797
Wheat Straw . . .	138	144	351	445	640	872

TABLE 2. Overall effect of confinement versus semi-confinement on the mean body weights (grams) at 8 and 12 weeks of age of Rhode Island Red chicks reared on different types of litter.

Treatment	Age in weeks					
	8 weeks			12 weeks		
	C	S	Mean	C	S	Mean
Corn Cobs . . . . .	370	393	381	682	754	720
Wood Shavings . . .	374	442	442	679	736	708
Rice Straw . . . . .	364	381	381	699	750	725
Bean Straw . . . . .	378	390	390	690	733	711
Sugar-cane Pulp . . .	361	390	390	685	722	703
Wheat Straw . . . .	382	386	386	676	751	716

C : Confinement  
S : Semi-Confinement

TABLE 3. Effect of different types of litter on the mortality (percent) of Rhode Island Red Chicks till 12 weeks age

Treatment	Age in weeks												Total Mortality	
	0 - 4				4 - 8				8 - 12					
	C		S		C		S		C		S		C	S
	No.	M%	No.	M%	No.	M%	No.	M%	No.	M%	No.	M%		
Corn cobs . . . . .	665	11.4	708	18.3	589	17.0	578	12.0	489	4.9	508	1.7	32.9	24.9
Wood shavings . . . . .	699	8.5	695	11.3	640	15.0	616	14.0	543	8.6	528	4.0	29.0	26.8
Rice straw . . . . .	699	4.0	695	5.0	671	16.4	660	15.0	560	4.8	558	5.0	23.7	23.7
Bean straw . . . . .	700	8.4	695	19.7	641	12.0	558	13.9	562	3.9	480	4.0	22.8	33.6
Sugar cane pulp . . . . .	700	7.0	700	8.1	651	15.7	643	12.4	549	7.6	563	4.4	27.5	23.0
Wheat Straw . . . . .	700	10.4	700	8.9	627	13.0	631	10.0	544	3.6	566	3.5	27.0	22.0
Total Mortality . . . . .	6143	8.2	4193	12.0	3819	9.7	3686	13.0	3249	4.9	3203	3.8	25.8	26.5

C : Confinement  
S : Semi-confinement  
M : Mortality percent

The highest body weight of 725 grams was that of the group reared on rice straw, while the lowest body weight of 703 grams was that of the group reared on sugar cane pulp (Table 2). However, it was shown that there were highly significant interaction between mean body weights of birds reared on different types of litter under confinement and semi-confinement systems.

Under the confinement system the highest mean body weight of 699 grams was that of the group reared on rice straw, while the lowest mean body weight of 676 grams was that of the group reared on wheat straw (Table 2). This was not the same for groups reared under the semi-confinement system, since the highest body weight (754 grams) and the lowest (722 grams) were those of the groups reared on corn cobs and sugar cane pulp respectively.

#### Mortality

There were noticeable differences in the percentage of mortality at 4 weeks of age between groups reared on different types of litter (Table 3). However there was not set pattern of the percentage of mortality of the groups reared on different types of litter and under different systems of rearing.

#### Feed efficiency

Table 4 shows the feed efficiency values from hatch to 12 weeks of age. In general, the two hatches of the second season had better feed efficiency values than the two hatches of the first. This is to be expected since the growth rate of the birds of the second season was exceedingly better. These results are in harmony with that reported by Trail (1963).

Neither the use of different types of litter nor the different systems of rearing seemed to cause any appreciable differences in feed efficiency.

Further investigations are needed to study the problem of the use of the most appropriate type of litter under different rearing systems.

TABLE 4. Feed efficiency percentages of Rhode Island Red Chicks reared on different types of litter from hatch to twelve weeks of age.

Date of Hatch	Treatments											
	Corn Cobs		Wood Shavings		Rice Straw		Bean Straw		Sugar-cane pulps		Wheat Straw	
	C	S	C	S	C	S	C	S	C	S	C	S
19-1-58	4.3	4.2	3.9	4.2	3.6	3.7	3.8	3.9	4.3	3.8	3.9	4.0
26-1-58	3.6	3.9	3.6	3.8	3.6	3.8	3.5	3.7	3.4	4.0	3.3	3.9
27-10-58	3.2	2.6	3.3	2.8	3.1	3.1	3.1	3.8	3.5	3.2	3.4	2.7
4-12-58	3.1	2.9	3.0	3.4	3.2	2.9	4.2	2.7	3.6	3.1	3.0	3.1
Total . . .	3.4	3.1	3.2	3.3	3.3	3.3	3.4	3.2	3.4	3.2	3.3	3.3

Total feed efficiency                      Confinement    3.1                      Semi-Confinement    3.09

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## تأثير الأنواع المختلفة للفرشة على النمو ومعدلات الاستفادة الغذائية والحيوية في الكتاكيت

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أجريت هذه الدراسة لمعرفة تأثير أنواع الفرشة المختلفة على النمو والحيوية ومعدل الاستفادة الغذائية تحت نظم التربية المختلفة .

استخدم في هذه التجربة جيلين من كتاكيت الرود أيلند عددها ٨٣٤٩ كتكوت واستخدم من كل جيل فقسين تم تربيتها على أنواع مختلفة من الفرشة ( قوالب الذرة المكسرة - نشارة الخشب - قش الارز - تبن الفول - مصاصية القصب - تبن القمح ) وتحت نظامين للتربية هما الحبس الكامل حيث لا توجد أحواش للعشوش وشبه الحبس وفيه توجد أحواش تخرج إليها الكتاكيت وقد كان أعلى متوسط لوزن الجسم بين كتاكيت المجموعة المرباه على قش الارز بينما كان أقلها في الوزن المجموعة المرباه على مصاصية القصب . وقد وجد أن أوزان المجاميع المرباه تحت نظام شبه الحبس بصرف النظر عن نوع الفرشة المستخدمة - تزيد على مثيلاتها المرباه تحت نظام الحبس .

وقد ظهرت فروق معنوية بين أوزان المجاميع المرباه على الأنواع المختلفة من الفرشة تحت نظامي التربية المتبعين وعموما لم يكن هناك منوال معين للنسبة المثوية للوفيات بين المجاميع المختلفة وتحت نظم التربية المختلفة .

وقد ظهرت وفيات عالية في بعض مجاميع الجيل الثاني نتيجة لظهور مرض الكوكسيديا بها وأيضا لم يكن هناك فروق محسوسة في معدل الاستفادة الغذائية نتيجة لنظم التربية المختلفة أو لنوع الفرشة