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Impact of biostimulator (Biovet) on production of broiler birds

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Abstract
The daily feed consumption of broilers from 1st to 8th weeks of age of control and experimental groups has been recorded in average daily feed consumption of broiler chickens was 60.19±29.30 and 63.69±30.50g in control and experimental groups, respectively. In between the two groups in the first week of age the feed consumption was almost equal (17.68 and 18.63g), whereas from 2nd to 8th weeks of age the daily feed consumption of broilers was found to be increased in both the groups under trial. The average weekly feed consumption by broilers was 421.35±205.00 g and 445.86±214.00 g in control and experimental groups, respectively. The average cumulative feed consumption remained 1458.59±1156.00g and 1549.47±1221.00g in the control and experimental groups, respectively. The maximum mean body weight gain of 1341.40 g was recorded for broilers belonging to control group. In 'Biovet' fed experimental group the average body weight gain at the age of 8 weeks was found to be 1534.40 g. Difference in body weight of broilers between control and experimental groups was found to be 13.33, 46.00, 28.76, 34.05, 47.62, 82.15, 165.00 and 193.00 g, respectively from 1st to 8th weeks of age. There has been constant increase in body weight form 1st to 8th weeks of age in both the groups. The average feed consumed per kg body weight was found to be 2.09±0.30 and 1.97±0.36kg in control and experimental groups, respectively.

Keywords: Broiler chick, Biovet and Body weight

1. Introduction
Poultry meat is an ideal food for infants, young, children, adults, and old people and for those attempting to control their weight. Poultry broiler meat is low in fat and hence has less calories that is about 150 calories per 100 gm of meat. Broilers today attain 2.0 kg in 40 days. Along with the genetic development, the nutritional requirement of the birds also has undergone tremendous changes, and farmers have had to change their style and methodology of management and feeding to exploit the genetic potential to its fullest capacity.

The major action of prebiotics is to stimulate the growth and/or activate the metabolism of some groups of beneficial bacteria in the intestinal tract, acting in association with probiotics. Therefore, the association between prebiotics and probiotics is technically indicated and some commercial products are already available.

These are termed as PROBIOTIC, the term probiotic etymologically appears to be a composite of the Latin preposition *pro* ("for" or "in support") and the Greek adjective (biotic) from the noun *bios* ("life") meaning 'for life' or 'in support of life' and has had several different meanings over the years. It was first used by [1] to describe substances secreted by one microorganism which stimulated the growth of another. It thus meant the exact opposite of antibiotic [2]. Prebiotics are meant to provide a substrate for beneficial gastrointestinal microbes. The non-digestible inulin-type fructans are found widely in many vegetable feed and food ingredients and are perhaps the most well studied and documented prebiotics in domesticated animals [3]. The use of prebiotics or fermentable sugars instead of antibiotics is going to be popular in birds in order to improve the useful microbial population of the Gastrointestinal (GI) tract [4]. Prebiotics have been shown to alter GI microflora, alter the immune system, prevent colon cancer, reduce pathogen invasion including pathogens such as *Salmonella enteritidis* and *E. coil* and reduce cholesterol and odour compounds [5]. The commercially available fermentation product of *Aspergillus orizae,* Fermacto referred to as *Aspergillus* Meal (AM), has no live cells or spores and is proven to enhance the digestive efficiency of the gut [3]. As [6] reported, *Aspergillus oryzae* might act as substrates for favourable bacteria such as *Lactobacillus* in the intestinal microbial system that subsequently reduces *Salmonella* or *E. coil* concentrations. 'BIOVET' manufactured by work hard has been claimed to contain some important enzymes like protease, lactase, acid phosphates and lipase. It also contains essential amino acids, minerals and vitamins.

2. Materials and Methods

500 broiler chicks were procured from M/S Rani Shaver Poultry Breeding Farm, Delhi. These birds were reared at the Poultry Research Unit, Udai Pratap Autonomous College, Varanasi (Uttar Pradesh), A part of this stock was used in the experiments to observe the effect of feeding biostimulator 'BIOVET' (Wokhardt) on poultry production and to assess the keeping quality of poultry products and their ultimate use on poultry production.

2. Pre-experimental preparation of birds

The consignment of five day old broiler chicks was put on starter ration and water for few days containing glucose. The chicks were reared for two weeks in artificial steel brooders provided with electric bulbs for regulating temperature. These were fed chicks mash obtained from Jhunjhunwala Feed Factory Ashapur Varanasi, and usual management care about sanitation, feeding and watering was under taken. At the end of 2 weeks, these were shifted to grower house provided with deep litter. Since the chicks were already vaccinated against Ranikhet F_1 and Marex M_2 by the supplier, no other vaccination except that for fowl pox was done when the birds attained age of three month.

2.1 Selection and grouping of experimental birds

After rearing thirty five days old broiler chicks were observed as uniform in respect of body size, body weight, vigour etc and body confirmation were randomly selected for the experiment on broilers. The selected broilers were also equally divided into two groups, 20 each group (control and experimental) on the basis of body weight.

2.1.1 Housing and management

The birds control and experimental groups were maintained in separate cubicles of het poultry shed under deep litter system. The groups were raised under similar husbandry and management conditions. The litter was occasionally tilted and wet portion, was removed at the same day.

2.1.2 Feeding and watering

Supply of well balanced poultry mash were obtained from Jhunjhunwala Feed Factory, Ashapur, Varanasi as per requirement of birds (Table 1) and clean fresh drinking water was made ad libitum to all the birds. Feed was supplied in metallic feeders meant for the purpose. Potassium permanganate solution was added in drinking water to keep off water born infection in all the groups of poultry birds under experimentation.

2.1.3 Treatment offered

'*Biovet' a biologically derived biostmulator by wokhardt* Veterinary limited containing enzymes, vitamins, minerals and organic nitrogen was given to layers and broilers @ 2 ml/litre drinking water. This Biovet fortified water was available ad libitum to experimental groups of broilers. The trial lasted 56 days for broilers. The Biovet feed group was designated as experimental while the other one as control.

One day old broiler checks (20) were randomly selected from existing new stock, which should uniformity 38 to 40 g body weights in respect to body size. These were divided into two groups of 10 each (control and experimental). Both the groups were shifted to the experimental shed. The control group of chicks received conventional ration ad libitum. The ration for experimental group was supplemented with stored solar dried poultry products at @ 20g/kg of broiler mash. This trial lasted for 49 days and data were recorded for average feed consumption, body weight and feed conversion efficiency of broiler chickens.

2.2 Determination of the live birds' weight

The day housing in the experimental shed throughout the duration of the experiments the birds of each group were weighed individually a week.

2.3 Slaughter and dressing of broilers

The termination of experiment on broilers from both of the treatments fifteen birds, three from each group, were slaughtered and weight of each bird was recorded. Slaughtering was done by "Hallal" method.

(a) Defeathering: After removing the heads birds were defeathered by hand plucking. These feathers were put in a weighed polyethene bag and weighed again to get their weight by difference.

(b) Deskinning: After completing the defeathering, skin of the carcass was separated from all parts as far as possible. The deskinned carcass was weighted on a single pan balance.

(c) Evisceration: After removal of head and deskinning, the shanks were removed, and then evisceration was done. During this process the abdomen was opened and all eth internal organs including heart, Lungs, spleen, liver and the gut were removed. The kidneys were also scratched out as fast as possible. The contents of the gastrointestinal tract were taken out and the whole digestive tract starting from crop including proventriculus, gizzard, small and large intestine weighted. Eviscerated body was weighted on the same balance, and the percentage of the eviscerated carcass and cut parts with respect to live weight of the broiler was calculated. The eviscerated body was cut into pieces as neck, thigh, wing, breast and back.

2.4 Storage of poultry products

The wide mouth glass stoopered bottles were washed with bleaching powder and kept into hot air oven for 48 hours at 70 ^{0}C for drying and sterilization. The solar dried chicken meat, in the powdered form was transferred in the sterilized glass bottles. This process was done in inoculation glass chamber with the help of spirit lamp to avoid any bacterial contamination. The bottles were plugged tightly with the help of grease to avoid the entry of air and these were kept at room temperature. Few samples were also stored in refrigerator to assess the keeping quality of the finished products.

2.5. Maintenance of records

Recorded the body weight, growth rate, feed consumed by broilers, meat produced by the broilers were regularly maintained throughout the experiments. Control and experimental temperature was recorded by (maximum and minimum thermometer) of each day during both experiment. Relative humidity was recorded with the help of zeal make (dry and wet bulb) hygrometer.

2.6 Statistical analysis

The data pertaining to each character of the control and experiment were tabulated and finally analyzed statistically by applying the standard technique to draw a valid conclusion. For the analysis Paired T-test was used as per the standard procedure given by Cochran and Cox (1957).

3. Results and Discussion

The data recorded during the progress of experimental observation on birds were statistically analyzed to assess the degree of variations due to treatments effect. The results were presented and depicted with the help of tables and figures at appropriate places. The effect of treatments has been compared taking into account the statistical parameters. In all the cases, first of all main effect of the treatments and then the statistically significant interaction effects are described.

3.1 Impact of biovet on broilers

3.1.1 Daily feed consumption per bird

It is clear from the table that average daily feed consumption of broiler chickens was 60.19±29.30 and 63.69±30.50 g in control and experimental groups, respectively. In between the two groups in the first week of age the feed consumption was almost equal (17.68 and 18.63g), whereas from 2nd to 8th weeks of age the daily feed consumption of broilers was found to be increased in both the groups under trial. 'Biovet' fed experimental birds consumed more feed per day as compared to control group of broilers and this increase in feed intake was highly significant (P<0.01) at the termination of the experiment (Table 2).

3.1.2 Weekly feed consumption (g)

Data regarding weekly feed consumption by broilers have been recorded in table 3. The maximum differences in feed consumption per broiler between the two groups were observed during 7th week of age. This table showed that the average weekly feed consumption by broilers was 421.35±205.00 g and 445.86±214.00 g in control and experimental groups, respectively.

3.1.3 Cumulative feed consumption (g)

Data presented in table 4 indicates that there exists among control and experimental groups significant difference in cumulative feed consumption by broilers at the end of experiment. The average cumulative feed consumption remained 1458.59±1156.00g and 1549.47±1221.0g in the control and experimental groups, respectively. The overall feed consumption was significantly higher (P<0.01) in experimental group.

3.1.4 Body weight (g)

The maximum mean body weight gain of 1341.40 g was recorded for broilers belonging to control group. In 'Biovet' fed experimental group the average body weight gain at the age of 8 weeks was found to be 1534.40 g. [7] to verify the effect of different probiotic strains applied through a drinking water source to fattening and carcass parameters of broiler ducks. Table 5 represents the difference in body weight of broilers between control and experimental groups. It was found to be 13.33, 46.00, 28.76, 34.05, 47.62, 82.15, 165.00 and 193.00 g, respectively from 1st to 8th weeks of age. There has been constant increase in body weight form 1st to 8th weeks of age in both the groups. The 'Biovet' fed group gained significantly more weight as compared to control group of broilers during the same period. Feed conversion ratio at 14 and 28 days were significantly (P<0.05) improved by the addition of Mos, enramycin or the combination of both [8].

3.1.5 Feed conversion efficiency

On the basis of table 6, the average feed consumed per kg body weight was found to be 2.09±0.30 and 1.97±0.36kg in control and experimental groups, respectively. This is indicating that the feed conversion efficiency was more than experimental than control groups. The data showed significant differences (P<0.01) between the efficiency of feed conversion among two groups and it's was significantly higher in experimental group of broilers chickens. Similarly, higher feed intake in NB+Trp group and HW-1 group compared with control group were observed. Feed efficiency (gain/feed) in HW-1 group was significantly higher than in control group [9]. and [10].

3.2 Impact of biovet on meat production and carcass quality

In terms of feed conversion economy for flesh production poultry ranks above that of other domestic animals. In the present study 'Biovet' feeding has been found to effect size of birds. As such it will be interesting to know whether 'Biovet feeding has also influenced the output of edible parts of broilers [11]. Similar showed that birds fed with AGP, MOS and DOS supplemented diets exhibited higher body weight gain (P < 0.05) and numerically improved feed efficiency than that of the control birds fed on basal diet.

3.2.1 Slaughter weight (g)

The slaughtering of broilers was done at the termination of experiment after the attainment of eight weeks of age. Three broilers form each group were randomly selected for slaughter experiment. Table 7 showed highly significant difference in slaughter weight of broilers between control and experimental groups. The mean slaughter weight of broilers of control and experimental groups was recorded 1130±131 and 1450±100 g, respectively. Effect of dietary supplementation with an antibiotic growth promoter (AGP) and two prebiotics; mannan oligosaccharide (MOS) and dextran oligosaccharide (DOS), respectively, due to enhanced more growth performance and some slaughter characteristics of broilers [11].

3.2.2 Eviscerated weight (g) and eviscerated weight (per cent)

Data on significantly increase in eviscerated carcass (without head, neck and feet) weight was recorded for the experimental groups. This table 8 showed that impact of biostimulator 'Biovet' on dressed eviscerated weight in broiler chickens between the two groups of broilers under observation. The average eviscerated weight was 665.67±78.40 and 932.67±72.9g in control and experimental groups, respectively. The mean per cent of eviscerated weight in control group was 58.90±0.43 and in experimental group 63.40±1.70.

3.2.3 Giblet weight (g) and giblet weight (per cent)

On the basis of table 9, the mean of giblet weight of control and experimental groups has been recorded as 74.00 ± 2.65 g and 76.00 ± 4.00 g, respectively which is higher in experimental groups. The mean per cent were 6.60±0.67 and 5.25±0.09 in control and experimental groups, respectively.

3.2.4 Neck weight (g) and neck weight (per cent)

The figure is significantly higher (P<0.05) for experimental group. Significantly increase in neck weight was recorded for the experimental group (Table 10). Mean weight of neck portion of dressed broilers for control and experimental groups was 35.67±7.51 and 47.67±2.52g, respectively. In terms of percentage the neck weight of broilers was found to be 3.14 ± 0.38 and 3.30 ± 0.35 per cent in control and

experimental groups respectively.

3.2.5 Breast weight (per cent) and breast weight (per cent)
The average breast weight of broilers in control and experimental groups as 169.67±17.16 and 259.67±12.10g, respectively and which was significantly higher in experimental group (Table 11). The breast weight of dressed broilers ranged between 167 to 188g and 246 to 269g for control and experimental groups, respectively. In terms of percentage the average breast weight was 15.04±0.52 and 17.93±0.50 percent in control and experimental groups, respectively. These results indicate that good quality DOGS could be used in broiler diets at levels of 15 to 20per cent with little adverse effect on live performance but might result in some loss of dressing percentage or breast meat yield [12].

3.2.6 Back weight (g) and back weight (per cent)
The significant increase in back weight was recorded for the experimental group (Table 12). Mean weight of back portion of dressed broilers for control and experimental groups was 155±30.51 and 218.67±33.67g, respectively. In terms of percentage the back weight of broilers was found to be 13.63 ± 1.34 and 15.16 ± 2.72 per cent in control and experimental groups, respectively.

3.2.7 Thigh and Drumstick weight (g) and thigh and drumstick weight (per cent)
The mean of thigh and drumstick weight of control and experimental groups has been recorded in table 13 as 214.33±27.06 and 291.00±12.29g, respectively. Percentage of the back weight of broilers was found to be 18.95 ± 0.41 and 20.10 ± 0.64 per cent in control and experimental groups, respectively. The figure is significantly higher (P<0.05) for experimental group. [13] the improvement of chick performance due to added betaine was depressed when chicks received diets containing recommended methionine, whereas, chicks performance improved by increasing folic acid level.

3.2.8 Wing weight (g) and wing weight (per cent)
Mean weight of wings was observed as 81.0±10.44 and 129.0±12.49g in control and experimental groups, respectively. Significant percentage of wing weight was worked out to be as 7.16 ± 0.28 and 8.89 ± 0.33 percent in control and experimental groups, respectively (Table 14). The above observations indicate that there is pronounced effect of 'Biovet' on eviscerated weight, breast weight, and back weight, thigh and drumstick weight indicating the production of more edible meat by the broilers. By comparing data of both the groups, meat production of broilers on 'Biovet' fed experimental group was found to be superior to control group of broiler chickens. The average edible meat and dressing percentage obtained from experimental group was significantly higher than control group. Further, the quality of meat produced by 'Biovet' fed experimental group was also superior as they contained more breast meat and less abdominal fat as compared to controls. The figures for eviscerated carcass weight, breast weight and back weight were 4.96 per cent and 9.64 per cent higher in experimental group. Similarly thigh and drumstick weight on average was 63.34 g more in 'Biovet' fed broiler chickens.

Table 1: Composition of Jhunjhunwala broiler mash

S. No.	Specification	Percentage	
		Broiler Starter	Broiler finisher
1.	Crude protein	23.0	20.0
2.	Crude fibre	5.0	5.0
3.	Calcium	1.0	1.0
4.	Phosphorus	0.5	0.5
5.	Lysine	1.22	1.06
6.	Methionine	0.83	0.72
7.	M.E.	2900 (kcal/kg)	3000 (kcal/kg)

Table 2: Impact of biostimulator 'Biovet' on daily feed consumption in broiler chickens

Age in weeks	Feed consumption /bird /day (g)		Calculated 't' value	Tabulated 't' value	
	Control group (15)	Experimental group (15)		5%	1%
1	17.68	18.63			
2	30.06	31.97			
3	42.44	46.25	5.28**		
4	55.40	60.54			
5	67.20	70.07		2.365	
6	80.54	82.44			
7	84.82	90.54			
8	103.40	109.11			3.499
Total	481.54	509.55	**Significant (P<0.01)		
Mean	60.19	63.69			
± S.E.	29.3	30.5			

Table 3: Impact of biostimulator 'Biovet' on weekly feed consumption in broiler chickens

Age in weeks	Weekly feed consumption /bird /day (g)		Calculated 't' value	Tabulated 't' value	
	Control group (18)	Experimental group (18)		5%	1%
1	123.76	130.41			
2	210.42	223.79			
3	297.08	323.75	5.28**		
4	387.80	423.78			
5	470.40	490.49		2.365	
6	563.78	577.08			
7	593.74	633.78			
8	723.80	763.77			3.499
Total	3370.78	3566.85	**Significant (P<0.01)		
Mean	421.35	445.86			
± S.E.	205.00	214.00			

Table 4: Impact of biostimulator 'Biovet' on the cumulative feed consumption in broiler chickens

Age in weeks	Cumulative feed consumption /bird /day (g)		Calculated 't' value	Tabulated 't' value	
	Control group (18)	Experimental group (18)		5%	1%
1	123.76	130.41			
2	334.18	354.20			
3	631.26	677.95	3.91**		
4	1019.06	1101.73			
5	1489.46	1592.22		2.365	
6	2053.24	2169.30			
7	2646.98	2803.08			
8	3370.78	3566.85			3.499
Total	11668.72	12395.74	**Significant (P<0.01)		
Mean	1458.59	1549.47			
± S.E.	1156.00	1221.00			

Table 5: Impact of biostimulator 'Biovet' on body weight in broiler chickens

Age in weeks	Feed consumption /bird /day (g)		Calculated 't' value	Tabulated 't' value	
	Control group (18)	Experimental group (18)		5%	1%
1	82.40	95.73			
2	170.40	216.40			
3	324.97	353.73	3.53**		
4	575.68	609.73			
5	722.11	769.73		2.365	
6	854.25	936.40			
7	1046.40	1211.40			
8	1341.40	1534.40			3.499
Total	5117.61	5727.52	**Significant (P<0.01)		
Mean	639.70	715.94			
± S.E	438.00	499.00			

Table 6: Impact of biostimulator 'Biovet' on the efficiency of feed conversion in broiler chickens (kg)

Age in weeks	Feed consumed/kg gain in body weight		Calculated 't' value	Tabulated 't' value	
	Control group (18)	Experimental group (18)		5%	1%
1	1.50	1.36			
2	1.96	1.64			
3	1.94	1.92	3.583**		
4	1.77	1.81			
5	2.06	2.07		2.365	
6	2.40	2.32			
7	2.53	2.31			
8	2.51	2.32			3.499
Total	16.68	15.75	**Significant (P<0.01)		
Mean	2.09	1.97			
± S.E.	0.37	0.36			

Table 7: Impact of biostimulator 'Biovet' on the slaughter weight in broiler chickens (g/bird)

S. No.	Control group	Experimental group	Calculated 't' value	Tabulated 't' value	
				5%	1%
1	1150	1350	4.37*		
2	990	1550		4.303	
3	1250	1450			9.925
Total	3390	4350	*significant (P<0.05)		
Mean	1130	1450			
± S.E.	131	100			

Table 8: Impact of biostimulator 'Biovet' on the dressed eviscerated weight in broiler chickens

S. No.	Eviscerated weight (g)		Cal. 't' value	Eviscerated weight (%)		Cal. 't' value	Tabulated 't' value	
	Control group	Expt. Group		Control group	Expt. Group		5%	1%
1.	683.00	850.00	4.68*	59.39	62.96	4.75*		
2.	580.00	988.00		58.59	63.74		4.303	
3.	734.00	960.00		58.72	66.21			9.925
Total	1997.00	2798.00		176.70	192.91	*Significant (P<0.05)		
Mean	665.67	932.67		58.90	64.30			
±S.E.	78.4	72.9		0.429	1.700			

Table 9: Impact of biostimulator 'Biovet' on giblet weight in broiler chickens

S. No.	Giblet weight (g)		Cal. 't' value	Giblet weight (%)		Cal. 't' value	Tabulated 't' value	
	Control group	Expt. Group		Control group	Expt. Group		5%	1%
1	72	72	0.79 NS	6.26	5.33	4.361*		
2	73	80		7.37	5.16		4.303	
3	77	76		6.16	5.24			9.925
Total	222.00	228.00		19.79	15.74	*Significant (P<0.05)		
Mean	74.00	76.00		6.60	5.25	N.S. non significant		
±S.E.	2.65	4.00		0.67	0.09			

Table 10: Impact of biostimulator 'Biovet' on neck weight in broiler chickens

S. No.	Neck weight (g)		Cal. 't' value	Neck weight (%)		Cal. 't' value	Tabulated 't' value	
	Control group	Expt. Group		Control group	Expt. Group		5%	1%
1	40	48	4.93*	3.48	3.56	4.39*		
2	27	45		2.73	2.90		4.303	
3	40	50		3.20	3.45			9.925
Total	107.00	143.00		9.41	9.91			
Mean	35.67	47.67		3.14	3.30	*Significant (P<0.05)		
±S.E.	7.51	2.52		0.38	0.35			

Table 11: Impact of biostimulator 'Biovet' on breast weight in broiler chickens

S. No.	Breast weight (g)		Cal. 't' value	Breast weight (%)		Cal. 't' value	Tabulated 't' value	
	Control group	Expt. Group		Control group	Expt. Group		5%	1%
1	167	246	7.18*	14.52	18.22	5.07*		
2	154	269		15.56	17.35		4.303	
3	188	264		15.04	18.21			9.925
Total	509.00	779.00		45.12	53.78	*Significant (P<0.05)		
Mean	169.67	259.67		15.04	17.93			
±S.E.	17.16	12.10		0.52	0.50			

Table 12: Impact of biostimulator 'Biovet' on back weight in broiler chickens

S. No.	Back weight (g)		Cal. 't' value	Back weight (%)		Cal. 't' value	Tabulated 't' value	
	Control group	Expt. Group		Control group	Expt. Group		5%	1%
1	169.00	210.00	5.44*	14.70	15.56	1.46 NS		
2	120.00	190.00		12.12	12.26		4.303	
3	176.00	256.00		14.08	17.66			9.925
Total	465.00	656.00		40.90	45.47	*Significant (P<0.05)		
Mean	155.00	218.67		13.63	15.16	N.S. non-significant		
±S.E.	30.51	33.84		1.34	2.72			

Table 13: Impact of biostimulator 'Biovet' on thigh and drumstick weight in broiler chickens

S. No.	Thigh and drumstick weight (g)		Cal. 't' value	Thigh and drumstick weight (%)		Cal. 't' value	Tabulated 't' value	
	Control group	Expt. Group		Control group	Expt. Group		5%	1%
1	223	277	3.88 NS	19.39	20.52	5.13*		
2	184	300		18.59	19.35		4.303	
3	236	296		18.88	20.41			9.925
Total	643.00	873.00		56.86	60.29	*Significant (P<0.05)		
Mean	214.33	291.00		18.95	20.10	N.S. non-significant		
±S.E.	27.06	12.29		0.41	0.64			

Table 14: Impact of biostimulator 'Biovet' on wing weight in broiler chickens

S. No.	Wing weight (g)		Cal. 't' value	Wing weight (g)		Cal. 't' value	Tabulated 't' value	
	Control group	Expt. Group		Control group	Expt. Group		5%	1%
1	86	115	4.32*	7.48	8.52	5.01*		
2	69	139		6.97	8.97		4.303	
3	88	133		7.04	9.17			9.925
Total	243.00	387.00		21.49	26.66	* significant (P<0.05)		
Mean	81.00	129.00		7.16	8.89			
±S.E.	10.44	12.49		0.28	0.33			

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