

EXECUTIVE SUMMARY

INTRODUCTION

India is the third largest global cotton producer with about 2.86 million tons of cotton lint a year. Cotton is essentially a crop grown in kharif, the rainy season and it is treated as a perennial crop.

About 162 species of insects are known to devour cotton plant at various stages of growth, of which 15 are considered to be the key pests.

This demands for use of several pesticides in order to achieve the desired production levels.

Intensive cultivation practices and indiscriminate use of pesticides have created resistance among some key pests.

To find possible ways of minimizing pest linked damage to cotton and effectively reduce the dependence on chemicals, transgenic cotton is being introduced in which cottonseed is modified by the insertion of the CryIAC gene from the bacterium *Bacillus thuringiensis* (Bt), such a GM cotton is also known as Bt cotton.

To check the safety of transgenic cotton, various studies are being conducted to ensure that the Bt cotton does not cause any adverse impact on the other living beings.

SRI has also undertaken toxicological studies of Bt cotton on large animals, egg laying hens and fish. The summaries of these studies are enclosed.

STUDY ON GOATS

EXPERIMENTAL DESIGN

Name of Breed	:	<i>The Indian Barbari breed</i>
No. of Groups	:	Two
No. of animals per group	:	12 (6 males and 6 females)
Age of the animals	:	12 months old
Weight of the animals	:	15-18 Kgs
Acclimatisation period	:	15 days

TREATMENT

The feed comprised of 12.5% cottonseeds and the concentrate itself was 10% of the total feed. All the groups of animals were fed conventional cotton seed in their diet during a minimum of 15 days acclimatization period, prior to start of the study.

OBSERVATIONS

Animals were observed once daily to record the clinical signs, morbidity and mortality. The body weights were recorded weekly. The feed consumption was recorded on daily basis. Haematological and biochemical evaluation was carried out, the parameter included WBC, RBC, Hb, Differential leukocytes, platelets and prothrombin time and GOT, GPT, Alkaline phosphatase, Blood urea nitrogen, total protein

TOXICOLOGY STUDY REPORT

PROJECT NO. : TOX / 313

SPONSOR : NATH SEEDS LTD.
NATH HOUSE,
NATH ROAD,
P. O. NO. 318,
AURANGABAD-431005.

SUBJECT : EVALUATION OF COTTONSEED MEAL
DERIVED FROM THE TRANSGENIC
COTTONSEED AS A FEED INGREDIENT
FOR GOATS.

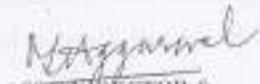
PRODUCT : TRANSGENIC COTTON SEEDS ALONG WITH
NON-TRANSGENIC COTTON SEEDS

MATERIAL
DESCRIPTION : BROWN COLOURED COTTON SEEDS

RESULT : The given samples of transgenic cottonseed did
not reveal any remarkable changes in the
experimental goats when compared with the
corresponding control group of animals fed on
non-transgenic cottonseeds.

TOTAL NO.
OF PAGES : 18


SCIENTIST
PATHOLOGY


ASST. DIRECTOR &
CHIEF TOXICOLOGY


DIRECTOR

SHRIRAM INSTITUTE FOR INDUSTRIAL RESEARCH
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SHRIRAM INSTITUTE

TOX-313
TRANSGENIC COTTON SEEDS
EVALUATION OF EFFECT OF TRANSGENIC COTTON SEEDS IN GOATS

1.0 INTRODUCTION :

India is one of the major producer of cotton in the world. It is an important source of oil and fibre for human, processed cottonseed for animals. There is a loss in the production of the cotton crop by almost 130 species of pests mostly Lepidopteran insects. Hence to overcome this, a new genetically modified cotton plant (Bt-cotton) has been produced by inserting insect control gene from *Bacillus thuringiensis*. These modified cotton have insecticidal activity against insect pest of cotton.

The cotton trait has been introduced into Indian cotton hybrids to provide Indian cotton growers an additional tool to protect the cotton crops from insect damage.

2.0 OBJECTIVE

1. To determine the cumulative effects, occurring by a Transgenic product, as a result of its repeated daily oral feeding, when compared to its control counterpart.
2. Provides information regarding possible health hazards due to repeated exposure over a limited period of time.

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EVALUATION OF EFFECT OF TRANSGENIC COTTONSEEDS IN GOATS

3. The study provides the information on target organ and the possibility of cumulation and for the selection of dose level for chronic studies.

3.0 EXPERIMENTAL DESIGN

Name of Breed	:	<i>The Indian Barberi breed</i>
No. of animals per group	:	12 (6 males and 6 females)
Age of the animals	:	12 months old
Weight of the animals	:	15 -18 Kgs
Acclimatisation period	:	Not less than 15 days

4.0 HUSBANDRY

All the animals were housed in properly constructed pens. Each pen measuring more than 1.5 sq.mt. per goat, allowed proper movement to the animals. The floor of the pen was made-up of concrete and walls of bricks. Each pen held a single goat with an identifiable number. The goats were allowed to go out from their pens in an open field for about 2-3 hours each day.

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EVALUATION OF EFFECT OF TRANSGENIC COTTONSEED IN GOATS

5.0 PREPARATION OF DOSE

Test sample diet was prepared by blending the test substance directly with the ration. The test comprised feeding goats, 90 days regularly with concentrate, of which 12.5% cottonseed and the concentrate itself is 10% of the total feed.

All the groups of animals were fed conventional cottonseed in their diet during a minimum 15 days acclimatization period prior to start of the study.

6.0 TREATMENT SCHEDULE

Group 1 - Non transgenic cottonseed

Group 2 - transgenic cottonseed

7.0 OBSERVATIONS

Animals were observed once daily to record the clinical signs, morbidity and mortality. The body weights were recorded weekly. The feed consumption was recorded daily. At the end of 91 days all the animals were weighed. A record of all these parameters was maintained by the veterinarian.

8.0 HAEMATOLOGY

Haematology is carried out in blood. Blood is analysed for WBC, RBC, Hb, Differential leucocytes, platelets and prothrombin time.

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EVALUATION OF EFFECT OF TRANSGENIC COTTONSEED IN GOATS

9.0 CLINICAL ENZYMES (BIOCHEMICAL PARAMETERS)

Serum and blood were analysed for :

1. GOT¹ (Glutamic Oxaloacetic Transaminase)
2. GPT (Glutamic Pyruvic Transaminase)
3. Alkaline phosphatase
4. Blood urea nitrogen
5. Total protein

10.0 RESULTS

10.1 Mortality and toxic signs & symptoms

No mortality was observed in both the groups of animals. No toxic signs and symptoms were noticed in any of the animals (Table-1-6).

10.2 Mean body weights

No significant differences were observed in the body weight gain / loss in any of the animals of the both groups (Table-7).

10.3 Feed consumption

Feed consumption of all the animals was almost similar in the both groups.

10.4 Haematological evaluations

No significant changes were noted among all the animals of both the groups with respect to haematological findings, as all the parameters fell within the accepted limits of normal variations for goats in both the groups (Table-8&9).

10.4.1 Total Erythrocyte Count

There is no significant difference in the number of total erythrocytes of the goats of both the groups.

10.4.2 Total leucocyte count

The total number of leucocytes in the goats of the both the groups are not significantly different.

10.4.3 Differential leucocyte count

Analysis of blood showed no significant difference in the values of differential leucocyte count of the goats of both the groups.

10.4.4 Haemoglobin

The haemoglobin of all the goats of both the groups fell in the normal range and the values did not differ significantly in both the groups.

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TRANSGENIC COTTON SEEDS
EVALUATION OF EFFECT OF TRANSGENIC COTTONSEED IN GOATS

10.4.5 Total Platelet count

There was no significant difference in the values of total platelet count in the goats of both the groups.

10.4.6 Prothrombin time

The Prothrombin time of all the goats, of both the groups, fell in the normal range and values and did not differ significantly.

10.5 Clinical Biochemistry evaluations

Serum Biochemistry evaluations disclosed no significant differences in the goats of both the groups, as all the parameters fell within the accepted limits of normal variations (Table-10).

10.5.1 GOT (Glutamic Oxaloacetic Transaminase)

There is no significant difference in the values of Glutamic oxaloacetic transaminase in the goats of both the groups.

10.5.2 GPT (Glutamic Pyruvic Transaminase)

The Glutamic pyruvic transaminase of all the goats of both the groups fell in the normal range and values did not differ significantly.

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TON-315
TRANSGENIC COTTON SEEDS

EVALUATION OF EFFECT OF TRANSGENIC COTTONSEED IN GOATS

10.5.3 Alkaline Phosphatase

The alkaline phosphatase of all the goats of both the groups fell in the normal range and values did not differ significantly in both the groups.

10.5.4 Blood Urea Nitrogen

The biochemical analysis of serum showed no significant difference in the values of Blood urea nitrogen of the goats of both the groups.

10.5.5 Total Protein

There is no significant difference in the number of total protein value of the goats of both the groups.

11.0 Calculation and Evaluation of Data

The student 't' test was used for the statistical analysis of data to find out the level of significance ie, 'P' Value.

Conclusion :

The given samples of transgenic cottonseed did not reveal any remarkable changes in the experimental goats when compared with the corresponding control group of animals fed on non-transgenic cottonseeds.

TABLE-4: DAILY HEALTH RECORD OF THE GOATS OF GROUP-II
(IN THE MONTH OF DECEMBER)

DATE	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31						
FEMALE																																					
697	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H			
698	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H		
703	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
704	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
705	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
706	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
713	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
40	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
46	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
47	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
MALE																																					
83	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
72	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
73	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
76	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
79	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
83	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	

B. Health

TABLE-5: DAILY HEALTH RECORD OF THE GOATS OF GROUP-II
(IN THE MONTH OF JANUARY)

DATE	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31											
FEMALE																																										
697	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H				
698	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H		
703	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
704	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
705	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
706	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
713	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
46	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
46	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
47	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
MALE																																										
67	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
72	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
73	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
76	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
79	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
83	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H

H- Healthy

TABLE-6: DAILY HEALTH RECORD OF THE GOATS OF GROUP-II
(IN THE MONTH OF FEBRUARY & MARCH)

DATE	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	01	02			
FEMALE																																				
697	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H		
698	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
703	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
704	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
705	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
706	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
713	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
40	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
46	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
47	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
MALE																																				
67	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
72	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
73	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
76	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
79	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
83	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H

H-Healthy

TABLE 4: HEMATOLOGICAL ANALYSIS OF GOATS ON DIFFERENT DAYS

HAIRS	RED BLOOD CELLS			W.B.C.			DIFFERENTIAL W.B.C.			LYMPHOCYTES			MONOCYTES		
	Day	Day	Day	Day	Day	Day	Day	Day	Day	Day	Day	Day	Day	Day	Day
GROUP A	1.24	1.28	1.26	1.06	1.08	1.07	0.92	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
601 F	1.33	1.37	1.35	1.18	1.20	1.19	1.03	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
701 F	1.33	1.37	1.35	1.18	1.20	1.19	1.03	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
801 F	1.33	1.37	1.35	1.18	1.20	1.19	1.03	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
901 F	1.33	1.37	1.35	1.18	1.20	1.19	1.03	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
1001 F	1.33	1.37	1.35	1.18	1.20	1.19	1.03	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
1101 F	1.33	1.37	1.35	1.18	1.20	1.19	1.03	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
1201 F	1.33	1.37	1.35	1.18	1.20	1.19	1.03	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
1301 F	1.33	1.37	1.35	1.18	1.20	1.19	1.03	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
1401 F	1.33	1.37	1.35	1.18	1.20	1.19	1.03	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
1501 F	1.33	1.37	1.35	1.18	1.20	1.19	1.03	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
1601 F	1.33	1.37	1.35	1.18	1.20	1.19	1.03	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
1701 F	1.33	1.37	1.35	1.18	1.20	1.19	1.03	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
1801 F	1.33	1.37	1.35	1.18	1.20	1.19	1.03	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
1901 F	1.33	1.37	1.35	1.18	1.20	1.19	1.03	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
2001 F	1.33	1.37	1.35	1.18	1.20	1.19	1.03	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
MEAN	1.33	1.37	1.35	1.18	1.20	1.19	1.03	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
SD	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
GROUP B	1.40	1.44	1.42	1.22	1.24	1.23	1.07	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
601 F	1.49	1.53	1.51	1.32	1.34	1.33	1.17	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
701 F	1.49	1.53	1.51	1.32	1.34	1.33	1.17	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
801 F	1.49	1.53	1.51	1.32	1.34	1.33	1.17	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
901 F	1.49	1.53	1.51	1.32	1.34	1.33	1.17	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
1001 F	1.49	1.53	1.51	1.32	1.34	1.33	1.17	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
1101 F	1.49	1.53	1.51	1.32	1.34	1.33	1.17	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
1201 F	1.49	1.53	1.51	1.32	1.34	1.33	1.17	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
1301 F	1.49	1.53	1.51	1.32	1.34	1.33	1.17	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
1401 F	1.49	1.53	1.51	1.32	1.34	1.33	1.17	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
1501 F	1.49	1.53	1.51	1.32	1.34	1.33	1.17	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
1601 F	1.49	1.53	1.51	1.32	1.34	1.33	1.17	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
1701 F	1.49	1.53	1.51	1.32	1.34	1.33	1.17	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
1801 F	1.49	1.53	1.51	1.32	1.34	1.33	1.17	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
1901 F	1.49	1.53	1.51	1.32	1.34	1.33	1.17	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
2001 F	1.49	1.53	1.51	1.32	1.34	1.33	1.17	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
MEAN	1.49	1.53	1.51	1.32	1.34	1.33	1.17	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
SD	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05

TABLE-10: BIOCHEMICAL ANALYSIS OF GOATS ON DIFFERENT DAYS

DAYS	GALT		SPT		ALP		BUN		TOTAL PROTEIN							
	Day	Day	Day	Day	Day	Day	Day	Day	Day	Day						
1	10.82	21.06	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
2	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
3	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
4	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
5	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
6	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
7	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
8	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
9	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
10	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
11	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
12	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
13	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
14	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
15	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
16	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
17	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
18	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
19	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
20	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
21	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
22	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
23	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
24	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
25	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
26	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
27	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
28	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
29	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
30	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
MEAN	11.14	21.07	20.17	33.32	5.14	3.07	4.85	5.10	428.0	297.4	1.54	0.33	0.79	0.02	0.76	0.33
SD	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10

STUDY ON LACTATING COWS

EXPERIMENTAL DESIGN

Ns. of animals per group	:	10 lactating multiparous cows
Acclimatisation period	:	15 days
Study duration	:	14 days pre study period followed by two 2X 28 days period

TREATMENT SCHEDULE

Initially all the cows were fed a diet containing commercial non-transgenic cottonseeds for two weeks, prior to the beginning of the study for acclimatization purposes. During these two weeks period, milk yield was determined to properly assign cows to their respective groups. After that 10 cows were given diet containing the test substance and 10 cows were given the diet containing the control cottonseeds. After 28 days, cows given the control cottonseeds were given test cottonseeds and cows given test cottonseeds were given control cottonseeds for the next 28 days.

The animals were fed the cottonseeds as a part of a total mixed diet where all diets have the same inclusion level of cottonseeds as part of the concentrate mixture. Cottonseeds were incorporated into the diet to achieve at least a 2 kg/ day consumption.

OBSERVATIONS

Animals were observed once daily for all health related observations. The body weights were recorded weekly. The feed consumption was recorded

daily. Individual milk yield after each milking was recorded. Milk samples were analyzed for fat, protein, lactose, total solids, ash and somatic cell counts.

RESULTS

No treatment related adverse effects were noticed in the animals of both the groups during the experimental period. All the experimental cows appeared healthy with their normal gait and posture.

No significant changes were noticed in the body weight and milk yield when compared between both the experimental groups. The test samples were provided through the feed concentrate and all the feed was consumed by the experimental cows.

Analysis of milk did not reveal any significant changes in any of the parameter such as fat, protein, lactose, total solids, ash and somatic cell counts. All the parameter fell in the normal range of limits.

CONCLUSION

Under the conditions of this study, the cows fed on transgenic cotton seeds, did not show any noticeable adverse effects on the health and milk production when compared with the control group of cows fed on non-transgenic cotton seeds.

SHRIRAM INSTITUTE

VOX-313
TRANSGENIC COTTON SEEDS
EVALUATION OF EFFECT OF TRANSGENIC COTTON SEED IN HENS

INTRODUCTION :

Cotton is one of the main fibre crops that India produces. India ranks number one in the world for total area planted to cotton, but the country is ranked third in the total cotton produced. One of the major drawbacks for cotton production is the damage caused by the insect pests, mainly the lepidopterans. The use of pesticide to control this pest is a very costly affair, moreover, the pesticide often pose a threat to the environment. As an effective and environmentally superior approach to provide tolerance against these insect pests, Bt-cotton was produced by modifying the conventional cotton by insertion of a gene from a naturally occurring bacterium.

OBJECTIVE

To assess the effects of feeding Bt-cotton seeds on the production of the eggs, composition of the egg shell, locomotor and general behaviour of the egg-laying hen as compared to feeding non-transgenic cottonseeds, grown under identical conditions.

EXPERIMENTAL DESIGN

No. of animals used	: 20 egg laying hens
Acclimatisation period	: 7 days
Number of birds used per dose	: 10 birds / dose
Route of administration	: Oral
Age of the birds	: 8-14 months

The study includes 20 Egg laying hens. All birds were healthy as certified by a veterinarian.

SHRIRAM INSTITUTE

TOX-313
TRANSGENIC COTTON SEEDS
EVALUATION OF EFFECT OF TRANSGENIC COTTONSEED IN HENS

STUDY DURATION

The study comprises of a 21- day study period.

HUSBANDRY

All the birds of treatment and control groups were housed inside a controlled environment building. The hens were taken outside the cages atleast twice a week. Each hen held an identifiable number.

TREATMENT SCHEDULE

Initially all the hens were fed a diet containing commercial non-transgenic cottonseeds for two weeks, prior to the beginning of the study for acclimatization purposes. During these two weeks period, egg laying capacity, the quality of eggs and incoordination in the movements of hens were recorded. After acclimatization 10 hens were given diet containing the test substance (Bt-cotton) and 10 were given diet containing the control cottonseeds for 21 days.

OBSERVATIONS

Hens were observed once daily for all health related observations. The body weights were recorded weekly. The feed consumption was recorded daily. The birds were also observed for behavioural abnormality, locomotor ataxia and paralysis. Number of egg received daily and eggs were analysed for their composition on day 0, day 14 and day 21.

SHRIRAM INSTITUTE

TOX-313
TRANSGENIC COTTON SEEDS
EVALUATION OF EFFECT OF TRANSGENIC COTTON SEED IN HENS

RESULT

Clinical Observation

Clinical observation of experimental hens revealed no remarkable changes in the health status like behavioral abnormality, locomotor ataxia and paralysis. All the birds had normal gait and posture. There was no noticeable difference in the body weight of hens of both the groups (Table-1&2).

The egg production from both the group (Group-I fed on nontransgenic cotton seed and Group-II fed on transgenic cotton seed) was found in the normal range (Table- 3&4).

The quality of eggs of the treated groups was comparable to the corresponding control group birds. The eggs were analysed for their protein, fat, phosphorus, calcium and shell thickness and all the parameters were found in the normal range of limits in both test (Group-II, fed on transgenic cotton seed) and control (Group-I fed on nontransgenic cotton seed) groups of the chicken (Table-5-10).

Calculation and Evaluation of Data

The student 't' test was used for the statistical analysis of data to find out the level of significance i.e. 'P' Value.

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SHRIRAM INSTITUTE

TOX-313
TRANSGENIC COTTON SEEDS
EVALUATION OF EFFECT OF TRANSGENIC COTTONSEED IN HENS

Conclusion :

The feeding trial of transgenic and non transgenic cotton seeds in the egg laying hens did not reveal any appreciable change.

TABLE -1: BODY WEIGHT IN GRAMS OF THE HENS OF GROUP I (FED ON NON-TRANSGENIC COTTON SEED) AT WEEKLY INTERVALS

HENS No.	Day 0	Day 7	Day 14	Day 21
1	1275	1323	1382	1412
2	1328	1362	1395	1442
3	1192	1230	1265	1298
4	1268	1292	1338	1392
5	1254	1276	1288	1324
6	1312	1354	1397	1432
7	1248	1287	1318	1376
8	1198	1236	1289	1424
9	1200	1237	1278	1312
10	1309	1349	1388	1409
Mean	1258.4	1294.6	1333.8	1382.1
SD	49.71072	50.74161	52.9356	52.65074

TABLE 2: BODY WEIGHT IN GRAMS OF THE HENS OF GROUP II (FED ON TRANSGENIC COTTON SEED) AT WEEKLY INTERVALS

HENS No.	Day 0	Day 7	Day 14	Day 21
1	1350	1378	1393	1418
2	1288	1316	1358	1397
3	1324	1363	1387	1430
4	1285	1318	1367	1393
5	1221	1267	1307	1338
6	1190	1232	1267	1297
7	1220	1271	1312	1357
8	1312	1368	1391	1426
9	1200	1258	1289	1307
10	1325	1359	1377	1411
Mean	1271.5	1313	1344.8	1377.4
SD	55.52702	50.36467	44.28724	46.82136

TABLE -4: TOTAL EGG PRODUCTION OF HENS (GROUP II FED ON TRANSGENIC COTTON SEED) IN 21 DAYS

Sl. No.	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	Day 15	Day 16	Day 17	Day 18	Day 19	Day 20	Day 21	
1	1	1	0	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	0	1	1
2	0	1	1	0	1	1	1	1	0	1	1	1	0	1	1	1	1	0	1	1	1	1
3	0	1	1	1	0	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	0	1
4	1	1	1	0	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	0	1	1
5	1	1	0	1	1	0	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	0
6	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	0
7	0	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1
8	1	1	0	1	1	1	0	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1
9	1	1	0	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	0	1	1	1
10	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	0

TABLE -5: COMPOSITION OF EGGS ON DAY 0 OF GROUP 1 (FED ON NON-TRANSGENIC COTTONSEEDS)

HENS NO.	PROTEIN (%/MASS)	FAT (%/MASS)	PHOSPHOROUS (mg/100mg)	CALCIUM (mg/100mg)	SHELL THICKNESS (mm)
1	12.75	37.72	145.20	74.90	0.8
2	11.07	44.97	198.30	92.70	0.8
3	12.65	35.52	172.50	78.40	0.7
4	11.82	41.62	298.60	93.70	0.8
5	11.84	43.60	178.20	88.10	0.8
6	13.16	46.04	160.40	84.60	0.8
7	13.22	36.47	175.90	86.40	0.8
8	13.55	36.52	146.50	92.50	0.8
9	12.44	40.73	228.90	109.02	0.8
10	14.21	39.66	147.20	75.20	0.8
MEAN	12.671	40.285	185.77	87.532	0.79
SD	0.926144	3.748233	47.29285	10.29611	0.031623

TABLE-6: COMPOSITION OF EGGS ON DAY 0 OF GROUP II (FED ON TRANSGENIC COTTONSEEDS)

HENS NO.	PROTEIN (%/MASS)	FAT (%/MASS)	PHOSPHOROUS (mg/100mg)	CALCIUM (mg/100mg)	SHELL THICKNESS (mm)
1	13.44	38.65	123.40	89.56	0.8
2	14.04	44.08	262.90	125.47	0.8
3	13.08	45.11	163.60	86.72	0.8
4	12.92	39.34	158.90	103.39	0.8
5	12.97	44.91	226.40	173.40	0.8
6	14.27	39.36	250.03	93.96	0.8
7	12.47	49.12	107.30	97.52	0.8
8	11.53	48.65	131.10	80.09	0.8
9	13.06	46.01	142.30	101.83	0.8
10	13.43	44.09	205.10	124.01	0.8
MEAN	13.121	43.932	177.103	108.195	0.8
SD	0.77357	3.738288	55.25821	26.82763	00.00

TABLE -7: COMPOSITION OF EGGS ON DAY 14 OF GROUP 1 (FED ON NON-TRANSGENIC COTTONSEEDS)

HENS NO.	PROTEIN (%/MASS)	FAT (%/MASS)	PHOSPHOROUS (mg/100mg)	CALCIUM (mg/100mg)	SHELL THICKNESS ₁ (mm)
1	12.32	38.00	152.05	78.25	0.80
2	12.55	45.49	247.92	95.76	0.80
3	12.11	33.49	118.69	74.52	0.80
4	12.40	39.95	392.12	86.06	0.80
5	12.62	44.16	189.91	88.74	0.80
6	13.22	39.72	133.53	81.27	0.80
7	13.54	41.94	239.80	81.00	0.80
8	12.77	38.39	375.05	70.16	0.80
9	12.53	35.97	191.51	68.46	0.80
10	13.15	37.33	246.55	62.79	0.80
MEAN	12.721	39.434	225.4678	78.701	0.8
SD	0.449604	3.663038	100.2485	10.03606	00.00

TABLE-8: COMPOSITION OF EGGS ON DAY 14 OF GROUP II (FED ON TRANSGENIC COTTONSEEDS)

HENS NO.	PROTEIN (%/MASS)	FAT (%/MASS)	PHOSPHOROUS (ug/100mg)	CALCIUM (mg/100mg)	SHELL THICKNESS (mm)
1	13.11	36.58	173.79	68.21	0.9
2	14.44	39.35	167.48	86.66	0.8
3	12.43	35.38	212.12	90.75	0.8
4	12.57	40.69	254.38	73.36	0.8
5	13.79	43.26	160.68	75.94	0.8
6	13.13	36.67	272.39	67.96	0.8
7	12.44	44.34	363.68	74.27	0.8
8	12.94	43.27	184.00	115.78	0.8
9	12.83	41.40	191.97	143.05	0.8
10	12.36	40.18	112.69	62.95	0.8
MEAN	13.0044	40.152	209.309	85.703	0.81
SD	0.665628	3.101716	71.10851	25.34355	0.031623

TABLE 4: COMPOSITION OF EGGS ON DAY 21 OF GROUP 1 (FED ON NON-TRANSGENIC COTTONSEEDS)

HENS NO.	PROTEIN (%/MASS)	FAT (%/MASS)	PHOSPHOROUS (mg/100mg)	CALCIUM (mg/100mg)	SHELL THICKNESS (mm)
1	13.38	37.56	173.86	69.37	0.8
2	13.63	39.75	158.40	77.68	0.8
3	13.43	40.69	213.36	98.79	0.8
4	12.86	35.38	256.28	99.58	0.8
5	14.14	43.62	162.68	80.32	0.8
6	13.89	38.67	272.39	312.28	0.9
7	12.46	42.34	361.25	118.82	0.9
8	12.88	41.40	186.81	91.79	0.8
9	12.81	40.47	193.94	81.22	0.8
10	13.13	41.29	114.67	62.37	0.8
MEAN	13.261	40.117	209.364	89.222	0.82
SD	0.528656	2.401241	70.71815	18.27193	0.042164

TOXICOLOGY STUDY REPORT

PROJECT NO. : TOX / 313

SPONSOR : NATH SEEDS LTD.,
NATH HOUSE,
NATH ROAD,
P. B. NO. 318,
ADRANGADAD-411005.

SUBJECT : EVALUATION OF COTTONSEED MEAL
DERIVED FROM THE TRANSGENIC
COTTONSEED AS A FEED INGREDIENT
FOR COWS

PRODUCT : TRANSGENIC COTTON SEEDS ALONG WITH
NON-TRANSGENIC COTTON SEEDS

MATERIAL
DESCRIPTION : BROWN COLOURED COTTON SEEDS

RESULT : Under the conditions of this study, the cows fed
on transgenic cotton seeds, did not show any
noticeable adverse effects on the health and milk
production when compared with the control
group of cows fed on non-transgenic cotton seeds

TOTAL NO.
OF PAGES : 28

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TON-313
TRANSGENIC COTTON SEEDS
EVALUATION OF EFFECT OF TRANSGENIC COTTONSEED IN COWS

1.0 INTRODUCTION:

Cotton was modified by introduction of Bt-genes to provide tolerance against insect pests. The cotton seed is utilized extensively during cattle ration as an energy fibre and protein source. This study was being conducted to compare performance of lactating cows when fed cotton seeds from the transgenic and conventional seeds.

2.0 OBJECTIVE

1. To assess the effects of Bt-cotton-seeds on feed intake, milk production and milk composition in lactating cows as compared to the non-transgenic cottonseeds, grown under identical conditions.
2. To study the health hazards in lactating cows on feeding of transgenic cotton seed.

3.0 EXPERIMENTAL DESIGN

Experimental animal	:	Karan swiss
No. of animals per group	:	10 lactating multiparous cow
Acclimatisation period	:	15 days

The study includes 20 lactating multiparous cows. All the animals have reached their peak in milk production for the lactation (approximately

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70 to 130 days) at the start of the study. All animals were healthy as certified by a qualified veterinarian.

4.0 STUDY DURATION

The study comprised of a 14- day acclimitization period followed by two successive periods of 28 days.

5.0 HUSBANDRY

All the animals were housed in properly constructed cow-sheds. Each cow shed provided enough paddock area for proper movement of the animals. Each cow held an identifiable number.

6.0 TREATMENT SCHEDULE

Initially all the cows were fed on a diet containing commercial non-transgenic cottonseeds for two weeks, prior to the beginning of the study for acclimatisation purposes. During these two weeks, the cows were assigned to their respective groups on the basis of their milk production. After that 10 cows were given diet containing the test substance, termed as Group-I and

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10 cows were given the diet containing the control cottonseeds, termed as Group-II. After 28-days, cows which received the control cottonseeds during first 28 days, were then given test cottonseeds and cows which received the test cottonseeds during first 28 days, were given control cotton seeds for the next 28 days.

The animals were fed the cottonseeds as a part of a total mixed diet where all diets had the same inclusion level of cottonseeds as part of the concentrate mixture. Cottonseeds were incorporated into the diet to achieve at least a 2 kg/day consumption.

7.0 OBSERVATIONS

7.1 Clinical Observations

Animals were observed once daily for all health related observations. The body weights were recorded weekly. The feed consumption was recorded daily.

7.2 Milk Yield And Composition of milk

Individual milk yield was recorded after each milking. Consecutive milk samples were taken at each milking within a day on days 3, 10, 17 and last 7 days of each 28 days period. The samples were analyzed for fat, protein, lactose, total solids, ash and somatic cell counts.

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8.0 RESULTS

8.1 Body weight of the animals

No significant change in the body weight of cows of the group-I and group-II were noticed during the study period (Table-1).

8.2 Feed consumption

Two kg of transgenic and two kg of non-transgenic feed were given to all the experimental animals for 28 days respectively and all the feed were consumed by experimental animals (Table-2-5).

8.3 Milk yield

Milk yield of cows of group-I and group-II did not show any significant difference when compared between both the experimental groups (Table-6&7).

8.4 Milk analysis

8.4.1 Fat

Milk analysis for the fat content was done on day 0, 3, 10, 17 and last seven days of each 28 days period. No significant changes were revealed in any of the experimental groups (Table-8&9).

8.4.2 Protein

The protein analysis for the collected samples of milk at different intervals during the experimentation showed no significant difference in the experimental animals (Table-10 &11).

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8.4.3 Lactose

Analysis of lactose content in the milk at different intervals, from the experimental cows of both the groups were found in the normal range. No significant difference was noticed after the data was analysed statistically (Table-12&13).

8.4.4 Total solid

The total solids in the milk of experimental animals at different intervals revealed no significant changes when compared with corresponding group of animals (Table-16&17).

8.4.5 Ash

Ash content in the milk samples collected at different intervals from both the experimental groups did not reveal any significant change after the statistical analysis of data (Table-14&15).

8.4.6 Somatic cell counts

Somatic cell count in the milk samples collected at different intervals fell in the normal range for all the experimental animals of both the groups. On statistical analysis no significant difference was noticed in any of the experimental groups.

9.0 Calculation and Evaluation of Data

The student 't' test was used for the statistical analysis of data to find out the level of significance ie. 'P' Value.

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Conclusion :

Under the conditions of this study, the cows fed on transgenic cotton seeds, did not show any noticeable adverse effects on the health and milk production when compared with the control group of cows fed on non-transgenic cotton seeds

TABLE-1
BODY WEIGHT OF DIFFERENT ANIMALS OF BOTH THE GROUPS AT DIFFERENT INTERVALS

DAY DATE	DAY 0 05-12-04	DAY 7 12-12-04	DAY 14 19-12-04	DAY 21 26-12-04	DAY 28 02-01-05	DAY 35 09-01-05	DAY 42 16-01-05	DAY 49 23-01-05	DAY 56 30-01-05
GROUP-I									
4151	383	393	390	389	387	393	387	395	398
4276	443	440	445	448	445	448	435	435	393
4374	371	372	374	374	376	375	421	424	434
5383	391	387	392	373	378	385	438	440	443
5430	456	443	439	441	449	448	423	426	429
5979	407	413	411	418	418	400	390	402	408
6008	476	462	467	467	463	510	347	355	356
6157	424	428	430	426	434	425	427	429	429
6376	497	451	438	430	433	425	433	440	432
6344	374	371	379	381	381	425	411	424	442
6376	361	348	369	376	369	425	338	345	342
6344	333	342	340	343	347	372	372	378	381
Mean	408.8353	403.25	404.75	405.25	407.3333	403.8167	450.75	403.70	408.8833
SD	37.16762	36.89809	26.99662	27.84418	27.91897	27.48374	33.66175	32.7362	35.96254
GROUP-II									
4238	368	386	390	388	388	395	363	368	402
4323	376	383	383	383	385	446	437	438	464
5388	414	419	420	422	415	377	372	370	373
5856	423	437	438	435	438	373	376	383	384
5952	385	388	389	389	390	458	467	470	475
5753	385	366	390	391	381	423	428	427	428
6053	329	331	333	344	344	467	467	466	463
6161	414	419	421	424	424	435	426	424	436
6275	405	407	411	410	420	435	424	417	435
6343	414	413	413	414	416	383	386	389	387
6391	404	408	410	428	426	371	364	365	372
6369	362	365	368	357	361	348	352	357	358
Mean	392	395.25	397.5	399.5	399.1667	409.4167	410.1667	412.8333	415.9167
SD	27.9415	28.35529	28.35329	28.28629	27.92143	38.23028	40.61982	40.58703	39.98195

TABLE - 2
DAILY HEALTH RECORD OF THE ANIMALS (Last 28 DAYS STUDY)

Cattle No.	Dec 19	Dec 20	Dec 21	Dec 22	Dec 23	Dec 24	Dec 25	Dec 26	Dec 27	Dec 28	Dec 29	Dec 30	Dec 31	Jan 1st	Jan 2nd
GROUP A															
4151	Healthy														
4176	Healthy														
4178	Healthy														
5357	Healthy														
5438	Healthy														
5979	Healthy														
6005	Healthy														
6008	Healthy														
6127	Healthy														
6237	Healthy														
6378	Healthy														
6344	Healthy														
GROUP B															
4231	Healthy														
4322	Healthy														
5585	Healthy														
3854	Healthy														
4954	Healthy														
6053	Healthy														
5753	Healthy														
6161	Healthy														
6172	Healthy														
6343	Healthy														
6391	Healthy														
6368	Healthy														

TABLE 3
DAILY HEALTH RECORD OF THE ANIMALS (DIND 28 DAYS STUDY)

Catth No.	Jan 2nd	Jan 4th	Jan 5th	Jan 6th	Jan 7th	Jan 8th	Jan 9th	Jan 10th	Jan 11th	Jan 12th	Jan 13th	Jan 14th	Jan 15th	Jan 16th
GROUP P-1														
4231	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
4232	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
5585	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
5858	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
5945	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
5723	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
6053	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
6161	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
6278	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
6342	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
6091	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
6369	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
GROUP P-2														
4151	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
4276	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
4278	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
4357	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
5836	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
5979	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
6065	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
6008	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
6157	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
5037	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
6376	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							
6344	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy							

Continued

TABLE 3
DAILY HEALTH RECORD OF THE ANIMALS (IND 28 DAYS STUDY)

Contd. No.	Jan 17	Jan 18	Jan 19	Jan 20	Jan 21	Jan 22	Jan 23	Jan 24	Jan 25	Jan 26	Jan 27	Jan 28	Jan 29	Jan 30
GROUP I														
4221	Healthy													
4375	Healthy													
5588	Healthy													
5858	Healthy													
5958	Healthy													
6053	Healthy													
6161	Healthy													
6275	Healthy													
6342	Healthy													
6390	Healthy													
6383	Healthy													
GROUP II														
4161	Healthy													
4276	Healthy													
4278	Healthy													
5357	Healthy													
5430	Healthy													
5779	Healthy													
6065	Healthy													
6088	Healthy													
6153	Healthy													
6237	Healthy													
6376	Healthy													
6344	Healthy													

TABLE-6
DAILY MILK YIELD (1st 28 Days Study)

Cattle No.	Dec 28h	Dec 4th	Dec 7th	Dec 10th	Dec 11h	Dec 12	Dec 13	Dec 14	Dec 15	Dec 16	Dec 17	Dec 18	Dec 19
61000													
P-1													
4151	11.5	13.5	12.0	11.5	12.0	11.0	11.5	10.0	9.0	9.0	9.0	9.0	10.0
4276	14.5	16.0	16.0	16.0	16.0	16.0	17.5	18.0	18.0	17.0	17.0	16.0	18.0
4278	16.0	18.0	18.0	18.0	18.0	17.0	16.0	17.5	17.0	17.5	17.5	17.5	17.5
5357	17.8	18.5	22.0	21.5	21.0	21.0	21.0	20.0	20.0	19.0	19.5	19.5	20.0
5430	8.0	4.0	4.5	4.5	5.0	5.0	6.0	6.0	6.0	6.0	6.0	6.0	7.0
5970	17.0	19.0	20.5	20.0	18.0	18.0	18.5	18.5	18.5	17.5	17.5	18.0	16.0
6009	20.0	17.5	20.0	20.0	21.0	19.0	18.5	18.0	18.5	21.5	21.0	21.5	21.0
6008	12.5	13.0	13.0	10.5	11.0	9.5	10.0	8.5	8.5	8.5	8.5	8.5	9.0
6157	17.8	20.0	19.0	19.0	17.5	17.5	19.5	19.0	19.0	17.0	17.0	17.0	16.0
5657	16.0	18.0	18.0	19.5	16.5	16.5	12.5	14.0	14.0	14.0	13.5	14.5	15.0
6376	16.5	17.8	15.5	15.8	16.5	16.0	16.5	13.5	14.0	14.0	14.5	14.5	16.0
6504	10.5	10.0	10.0	10.5	11.0	11.0	11.0	9.5	10.5	8.5	8.5	8.5	9.5
Mean	16.54	18.29	18.75	18.53	18.23	18.23	18.30	18.64	17.75	17.75	17.75	17.62	18.88
SD	3.80	4.40	4.35	5.05	4.72	4.51	4.58	4.34	4.32	4.87	5.24	5.05	5.26
61001													
P-11													
4331	14.0	11.5	13.5	13.5	14.0	14.5	13.0	13.0	14.0	14.5	14.5	14.0	14.0
4328	16.0	14.5	14.0	15.0	15.0	15.5	15.5	16.5	15.5	15.5	15.5	15.0	15.0
5383	21.5	20.0	19.0	24.0	23.0	20.5	21.0	20.5	20.5	22.0	21.5	21.0	22.0
5056	19.5	22.0	21.5	21.5	21.0	21.0	20.5	19.0	17.5	22.5	18.0	17.0	17.0
5044	13.5	12.5	16.0	16.0	16.0	16.0	17.0	17.5	17.5	19.0	16.0	17.0	18.0
5751	16.0	16.0	17.0	18.0	16.0	16.0	15.0	17.0	17.5	17.0	16.0	17.0	16.5
6053	10.0	10.0	17.5	20.0	18.5	18.5	20.0	19.5	20.0	22.0	20.5	20.5	19.0
6161	18.5	17.0	17.5	19.0	18.0	17.0	19.0	17.0	17.5	12.0	17.0	16.5	17.0
5275	15.5	15.0	14.0	14.0	14.5	13.5	14.0	15.5	11.5	15.8	14.5	13.0	13.5
6353	19.0	19.5	19.5	20.0	19.5	19.5	20.0	20.0	21.0	16.0	18.5	20.5	20.5
6391	12.5	12.5	12.5	12.5	12.5	12.5	12.5	13.0	12.5	12.5	12.5	12.5	12.5
6300	17.5	16.5	16.0	14.0	15.0	13.5	15.0	14.0	14.0	16.0	16.0	17.0	14.0
Mean	16.71	16.67	16.50	17.53	16.96	16.87	17.13	16.80	16.79	17.42	16.42	17.54	16.88
SD	2.80	2.65	2.71	3.74	2.84	2.95	3.13	2.88	3.33	3.26	2.65	2.88	3.26

Continuation

TABLE-6
DAILY MILK YIELD (1st 38 Days Study)

Cattle No.	Dec 20	Dec 21	Dec 22	Dec 23	Dec 24	Dec 25	Dec 26	Dec 27	Dec 28	Dec 29	Dec 30	Dec 31	Jan 1st	Jan 2nd
GROUP-I														
4151	10.5	10.0	9.5	9.0	10.0	9.5	10.5	10.5	9.0	10.0	10.5	10.5	12.0	11.5
4276	17.0	16.5	16.0	17.0	15.0	14.5	14.5	12.5	14.5	14.5	15.0	14.0	15.0	15.5
4178	17.5	17.5	17.5	15.5	15.0	14.5	13.0	15.0	13.0	16.0	14.0	16.0	13.0	16.5
5395	19.0	18.5	18.5	18.5	14.0	15.0	14.0	17.0	17.0	18.0	18.0	20.0	20.0	19.0
5430	5.5	6.5	4.5	5.0	6.5	5.5	6.5	6.0	5.0	5.0	5.0	4.5	5.5	5.5
6079	17.0	18.5	19.0	17.0	18.0	16.0	17.0	16.0	18.0	16.0	16.5	19.0	17.0	18.0
6086	18.0	19.5	19.5	21.0	21.5	22.5	19.0	21.5	22.5	20.5	22.0	23.0	24.0	24.0
6088	7.0	7.0	7.0	8.5	8.0	9.0	10.0	9.0	9.0	18.5	11.0	11.5	11.0	13.0
6157	17.5	17.0	17.0	18.0	14.0	14.5	15.0	16.5	14.5	17.5	15.0	15.5	14.0	18.0
6371	17.0	13.5	13.5	13.0	14.0	17.0	14.5	14.0	16.5	15.0	15.5	14.5	14.0	15.0
6576	16.0	16.5	16.5	17.0	14.5	14.5	14.5	15.5	16.0	15.5	15.0	14.5	13.0	15.0
6344	10.5	9.0	9.5	8.5	12.0	10.0	9.0	11.0	10.5	12.0	9.0	9.0	10.0	10.0
Mean	14.20	14.25	14.00	15.83	13.34	13.04	13.12	13.58	13.79	14.21	13.71	14.21	14.04	14.83
SD	4.88	4.08	4.57	4.03	4.09	4.14	3.53	4.29	4.78	4.21	4.43	3.07	4.76	4.57
GROUP-II														
4221	13.0	13.5	12.5	13.0	14.0	14.0	13.0	13.5	12.5	13.0	13.0	13.5	12.0	13.0
4323	15.0	15.0	13.5	14.0	16.0	17.0	16.5	17.5	18.0	16.5	16.5	16.0	15.5	16.0
5585	23.0	22.0	22.0	20.0	19.0	19.0	21.5	22.5	21.5	21.5	22.0	24.5	24.0	24.5
5956	20.0	20.0	18.0	19.0	21.5	21.5	21.5	21.5	21.0	20.5	21.0	21.5	21.0	21.5
5955	18.0	15.5	15.0	15.0	16.0	16.0	19.0	15.5	13.0	14.5	14.0	16.5	16.0	16.0
5753	17.5	16.0	16.5	16.5	16.5	17.5	16.5	17.0	17.0	16.5	15.5	16.0	16.0	17.0
6063	19.0	20.0	19.0	19.0	17.5	20.0	18.5	19.5	20.0	19.0	19.5	21.0	23.0	20.0
6161	17.5	18.0	15.5	15.0	15.0	15.5	14.0	14.5	16.5	16.5	16.0	16.5	15.0	15.5
6275	12.5	12.0	11.5	12.5	14.5	12.0	12.0	14.0	13.5	11.5	11.5	14.0	14.0	14.0
6343	19.5	19.5	20.0	19.5	20.5	21.0	19.5	20.5	21.0	22.5	19.5	20.0	21.5	21.0
6381	13.5	14.5	15.0	14.5	16.0	15.5	15.5	16.0	13.0	17.0	18.0	17.5	13.0	13.5
6369	14.5	15.0	13.0	13.5	13.0	13.0	13.5	14.0	13.5	13.5	13.5	14.5	16.5	17.5
Mean	15.92	17.00	15.96	15.86	16.63	16.08	16.50	17.17	16.96	16.80	16.67	17.63	17.13	17.46
SD	3.24	3.01	3.24	2.73	2.59	3.07	3.29	3.14	3.36	3.45	2.36	3.40	3.81	3.58

TABLE-7
DAILY MILK YIELD (Hind 28 Days Study)

Cattle No.	Jan 3rd	Jan 4th	Jan 5 th	Jan 6th	Jan 7th	Jan 8th	Jan 9th	Jan 10 th	Jan 11 th	Jan 12 th	Jan 13 th	Jan 14 th	Jan 15 th	Jan 16 th
GROUP-I														
4231	12.0	14.0	14.0	12.0	13.0	12.0	13.5	12.0	12.0	12.0	14.0	12.5	12.0	12.5
4325	16.0	15.5	14.5	15.0	17.0	15.5	17.0	16.0	16.0	18.0	10.0	16.0	16.0	16.0
5385	23.5	21.5	21.0	21.5	23.0	24.0	21.5	21.0	23.5	25.0	24.0	23.0	23.0	23.0
5886	21.5	20.0	19.5	21.0	21.5	21.0	22.0	21.0	21.0	21.5	22.0	20.5	20.0	21.0
5955	16.5	15.0	16.0	16.0	15.5	15.0	16.0	15.5	14.5	15.5	15.0	15.0	13.0	14.5
5753	17.0	16.5	16.0	10.5	16.5	16.0	15.5	17.5	16.5	17.0	18.0	18.0	18.5	19.0
6053	29.5	29.5	29.0	20.0	18.5	29.5	20.5	20.0	21.5	26.5	21.0	20.0	18.0	21.5
6161	16.0	17.0	16.0	19.0	16.0	15.0	18.5	15.5	15.0	15.0	17.0	15.0	14.0	15.0
6275	14.0	14.0	14.0	10.0	17.5	15.0	15.0	13.0	15.0	15.0	16.0	13.5	13.0	13.0
6343	21.5	20.0	18.5	17.0	21.0	21.5	21.5	21.5	21.5	23.0	23.0	18.5	20.5	22.5
6391	14.5	14.0	14.0	14.5	14.5	14.0	14.0	15.5	14.0	13.5	17.0	15.0	14.0	14.0
6369	18.0	17.0	15.0	16.5	17.5	17.5	18.0	17.0	17.0	16.0	18.0	18.0	16.5	17.0
Mean	17.59	17.17	16.83	17.42	17.63	17.53	17.67	17.13	17.29	17.58	18.42	17.00	16.53	17.53
SD	3.50	3.52	3.71	3.03	2.98	3.75	3.39	3.16	3.66	3.86	3.29	3.32	3.38	3.94
GROUP-II														
4751	11.0	10.0	13.5	10.0	10.0	10.5	9.5	10.0	10.0	10.0	9.0	10.0	10.0	9.5
4270	15.3	15.0	13.0	13.0	13.5	14.0	14.5	13.5	13.5	13.5	11.5	12.5	12.5	13.0
4278	17.0	12.5	15.0	13.5	14.5	14.0	14.0	15.0	14.5	16.0	14.0	14.0	14.5	16.0
5357	19.2	21.0	20.0	17.2	18.0	17.5	17.5	18.8	19.3	17.5	19.0	17.0	17.5	17.0
5430	8.0	5.5	5.5	8.0	8.0	5.0	5.0	5.5	5.5	5.5	6.0	5.5	5.0	5.0
5979	18.0	18.0	16.5	14.5	11.5	12.0	13.0	15.0	12.5	12.0	12.0	12.0	14.5	12.0
6005	21.5	21.0	22.0	21.0	20.0	23.0	23.0	23.5	24.0	22.0	22.5	20.0	21.0	22.0
6088	13.5	13.5	12.5	11.5	13.5	12.0	12.0	14.0	13.5	12.0	14.0	13.5	13.0	13.5
6157	14.5	14.0	14.5	12.0	13.5	8.5	14.0	14.5	16.5	11.0	12.0	14.5	14.0	18.0
5637	16.0	16.0	16.0	13.5	14.0	14.5	13.5	15.5	15.0	16.0	11.5	14.0	14.0	14.0
6376	14.5	12.5	11.5	13.5	13.5	14.0	12.5	12.0	13.0	12.0	13.0	14.0	14.0	14.0
6244	10.5	10.0	9.0	9.5	9.0	9.0	9.5	9.0	9.5	11.0	10.0	10.5	10.5	12.0
Mean	14.71	14.08	13.92	12.88	12.83	12.83	13.21	12.83	11.92	13.21	12.96	13.13	13.33	13.90
SD	4.42	4.72	4.92	3.82	3.94	4.61	4.40	4.59	4.77	4.21	4.35	3.61	3.92	4.10

TABLE 7
DAILY MILK YIELD (Herd 28 Days Study)

Continued

Cattle No.	Jan 17	Jan 18	Jan 19	Jan 20	Jan 21	Jan 22	Jan 23	Jan 24	Jan 25	Jan 26	Jan 27	Jan 28	Jan 29	Jan 30
GROUP 1														
4231	13.0	12.0	12.5	13.5	15.0	16.0	15.0	12.2	15.5	13.0	14.0	14.0	15.0	14.0
4232	15.0	17.6	16.0	16.5	16.0	16.0	15.0	15.5	15.0	15.0	15.5	15.0	15.5	15.0
4233	23.0	24.0	24.0	24.5	23.5	24.5	23.0	23.0	19.5	22.5	24.0	21.5	23.5	23.0
5885	20.5	20.0	21.5	19.0	21.0	21.0	20.5	20.5	22.0	14.5	14.0	15.0	15.5	14.5
5856	20.5	20.0	14.0	13.0	13.0	14.0	15.0	15.5	18.0	12.5	14.0	15.0	15.5	14.5
4058	15.5	14.0	17.0	18.0	17.5	17.5	18.5	18.5	18.0	20.0	21.0	21.0	19.0	21.0
5753	16.5	17.5	17.0	20.0	20.5	20.0	19.0	19.0	14.5	14.0	14.5	15.0	14.0	14.5
6053	20.0	20.5	16.0	16.0	15.5	15.5	14.0	14.0	23.0	20.0	20.0	19.5	20.0	21.0
6181	13.5	13.5	14.0	15.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
6272	14.0	13.5	14.0	15.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
6545	21.0	21.0	21.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
6201	15.0	13.5	14.0	14.5	14.5	14.5	14.5	14.5	18.0	18.0	18.0	18.0	18.0	18.0
6360	16.5	18.0	17.5	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
Mean	16.71	17.21	17.23	17.46	17.25	17.04	16.45	17.21	16.95	17.04	17.50	17.53	17.38	17.37
SD	3.47	3.65	3.79	3.47	3.03	3.40	5.00	3.25	3.35	3.63	3.74	3.59	3.60	3.60
GROUP 2														
4151	9.5	9.0	9.0	8.5	12.0	13.0	9.5	9.5	8.5	8.5	9.5	8.5	9.0	8.5
4276	13.5	11.5	11.0	11.0	13.0	13.0	12.0	12.0	12.0	13.0	12.5	9.5	11.0	10.0
4278	13.0	14.0	14.5	12.5	14.0	14.0	14.5	14.5	16.0	14.5	14.0	14.0	14.0	14.0
5357	16.5	16.5	16.0	16.5	16.0	16.0	15.0	18.0	16.5	17.0	16.0	15.5	16.5	15.5
5430	5.5	4.5	6.5	5.0	5.5	5.5	5.5	5.5	6.5	6.5	6.0	4.5	6.0	5.5
5979	12.5	17.0	11.0	12.5	12.0	12.0	12.0	12.5	10.5	12.5	13.0	13.0	11.0	11.0
6005	20.5	20.5	20.0	16.5	21.5	21.5	23.0	20.5	21.5	18.5	20.5	20.0	19.5	19.5
6088	11.5	12.5	12.5	12.0	13.5	13.5	13.0	13.0	15.0	16.0	14.5	11.5	12.0	13.0
6157	10.5	10.0	11.0	9.5	10.5	10.5	10.5	10.0	10.5	11.0	11.0	11.0	10.0	10.0
6037	13.5	13.0	14.0	13.0	14.5	14.5	13.0	13.0	14.0	13.5	13.0	12.0	13.0	12.0
6376	14.5	15.5	15.0	15.5	16.0	16.0	17.0	16.5	17.0	16.0	17.0	16.0	17.5	16.0
6344	9.5	9.0	10.0	10.5	11.5	11.5	10.0	9.0	9.5	11.0	10.5	9.0	9.0	8.5
MEAN	12.54	12.42	12.54	11.92	13.33	13.33	12.75	12.75	13.13	12.88	13.13	11.63	11.63	11.79
SD	3.79	3.96	3.96	3.37	3.80	3.80	3.95	3.97	4.20	3.67	3.77	4.03	3.90	4.26

TABLE - 8: MILK ANALYSIS FOR THE FAT (% BY MASS) CONTENT IN GROUP-I COWS.

Cow No.	Days of milk collection in first 18 days period												Days of milk collection in second 18 days period																								
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	Day 15	Day 16	Day 17	Day 18	Day 19	Day 20	Day 21	Day 22															
4133	3.1	3.9	3.2	3.6	3.5	3.8	3.7	3.5	3.6	3.7	3.8	3.7	3.8	3.7	3.9	4.0	4.0	4.2	4.3	4.3	4.4	4.5	3.5	3.7	3.8	3.7	3.8	3.7	3.9	4.0	4.1	4.1	4.2	4.3	4.4	4.5	
4176	4.1	4.8	3.6	4.2	4.0	4.0	4.3	4.3	4.3	4.3	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.2	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
4273	4.8	5.5	4.2	4.4	4.3	4.3	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
5157	3.8	3.8	3.6	4.3	3.6	3.3	4.0	3.7	3.4	3.3	3.4	3.3	3.4	3.3	3.4	3.3	3.4	3.3	3.4	3.3	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3		
5416	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
5827	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	
6078	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	
6885	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
8088	3.8	4.2	4.0	4.1	4.2	4.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	
8351	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
8344	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
8376	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
MEAN	4.14	4.11	4.13	4.18	4.08	4.07	4.08	4.07	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	
S.D.	0.29	0.41	0.21	0.21	0.28	0.41	0.42	0.27	0.40	0.38	0.29	0.28	0.29	0.28	0.29	0.28	0.29	0.28	0.29	0.28	0.29	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28

TABLE - 9 : MILK ANALYSIS FOR THE FAT (% BY MASS) CONTENT IN GROUP-II COWS

Cow No.	Days of milk collection (15 days period)															Days of milk analysis (15 days period)														
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	Day 15	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	Day 15
0211	3.3	4.0	4.0	4.3	3.8	3.8	4.0	4.4	3.7	3.7	4.2	4.0	4.6	3.8	4.0	3.7	4.2	4.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
4028	5.4	5.3	5.4	5.4	4.9	4.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
5040	6.3	5.8	6.1	6.4	5.8	5.5	5.8	5.7	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
8792	4.2	4.8	4.6	4.6	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
8856	3.4	4.1	4.2	3.8	3.8	3.8	3.8	3.7	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
8482	4.7	4.8	4.0	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
8455	3.9	4.0	4.3	4.1	4.0	4.1	4.1	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
4101	3.5	3.9	3.3	3.3	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
8278	3.7	3.8	3.6	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
6342	3.5	3.8	3.5	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
6049	5.6	4.8	4.1	4.1	4.8	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
6591	3.8	3.8	3.9	3.1	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
MEAN	4.08	4.09	4.12	4.18	4.05	4.01	4.05	4.04	4.07	4.07	4.07	4.07	4.07	4.07	4.07	4.07	4.07	4.07	4.07	4.07	4.07	4.07	4.07	4.07	4.07	4.07	4.07	4.07	4.07	
SD	0.38	0.33	0.65	0.48	0.46	0.44	0.43	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	

TABLE -10 : MILK ANALYSIS FOR THE PROTEIN (% BY MASS) CONTENT IN GROUP-I COWS

Cow No.	Days of milk collection in First 28 days period												Days of milk collection in second 28 days period																											
	Dec. 3	Dec. 4	Dec. 5	Dec. 6	Dec. 7	Dec. 8	Dec. 9	Dec. 10	Dec. 11	Dec. 12	Dec. 13	Dec. 14	Dec. 15	Dec. 16	Dec. 17	Dec. 18	Dec. 19	Dec. 20	Dec. 21	Dec. 22	Dec. 23	Dec. 24	Dec. 25	Dec. 26	Dec. 27	Dec. 28	Dec. 29	Dec. 30	Dec. 31	Dec. 32	Dec. 33	Dec. 34	Dec. 35	Dec. 36	Dec. 37	Dec. 38				
4331	3.4	3.6	3.5	3.5	3.7	3.6	3.5	3.6	3.5	3.4	3.3	3.6	3.5	3.4	3.7	3.6	3.5	3.4	3.3	3.6	3.5	3.4	3.3	3.6	3.5	3.4	3.3	3.2	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0
4216	3.5	3.2	3.2	3.2	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
4278	3.2	3.1	3.1	3.0	3.0	3.0	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
5377	3.2	3.4	3.5	3.7	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
6040	3.1	3.8	3.5	3.7	3.8	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
5927	3.6	3.2	3.6	3.3	3.3	3.2	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
5678	3.4	3.3	3.4	3.3	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
6065	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
6088	3.2	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
6125	3.2	3.8	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
6264	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
6336	3.3	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
5165	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
N	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
SD	0.13	0.11	0.13	0.13	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12

TABLE - II: MILK ANALYSIS FOR THE PROTEIN (% BY MASS) CONTENT IN GROUP-II COWS

Cow No.	Days of milk collection in first 28 days period														Days of milk collection in second 28 days period														
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	Day 15	Day 16	Day 17	Day 18	Day 19	Day 20	Day 21	Day 22	Day 23	Day 24	Day 25	Day 26	Day 27	Day 28	
4251	3.2	3.1	3.0	2.8	3.1	3.2	3.1	3.2	3.0	3.1	3.2	3.0	3.1	3.0	3.3	3.1	2.9	3.1	3.1	3.0	3.0	3.1	3.1	3.0	3.0	3.0	3.0	3.0	3.1
4325	3.2	3.1	3.3	2.8	2.8	2.8	3.0	2.8	3.1	3.1	3.1	3.0	3.0	3.0	3.3	3.0	2.8	3.3	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.2	3.2	3.1	
5885	3.4	3.0	3.0	2.7	2.8	2.8	2.8	3.0	2.8	2.7	3.1	3.1	2.8	2.9	3.3	3.1	2.8	2.9	3.0	2.8	2.8	2.8	3.2	3.1	3.2	3.1	3.0		
5755	3.3	3.3	3.2	3.4	3.4	3.1	3.2	3.2	3.3	3.4	3.6	3.3	3.2	3.4	3.3	3.2	3.4	3.3	3.2	2.9	2.9	3.0	3.0	3.0	3.0	3.0	3.0	3.1	
5856	2.8	3.3	3.2	3.1	3.1	3.0	2.9	3.1	2.8	2.8	2.8	3.1	3.0	2.9	3.1	3.0	2.9	3.1	3.1	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
5948	3.6	3.4	3.3	3.1	3.0	3.0	3.4	3.0	3.3	3.0	3.3	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.2	3.4	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.1	
6053	3.1	2.9	3.0	2.9	3.0	3.0	3.1	3.0	3.1	3.0	3.0	3.1	3.0	3.0	3.2	3.1	3.2	3.1	3.2	3.1	3.2	3.1	3.1	3.1	3.1	3.1	3.1	3.1	
6161	3.3	3.4	3.1	3.2	3.0	3.2	3.2	3.2	3.2	3.2	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	
6225	3.3	3.4	3.5	3.6	3.5	3.8	3.5	3.4	3.5	3.5	3.5	3.5	3.5	3.5	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	
6541	3.2	3.1	3.2	3.1	3.2	3.1	3.0	3.4	3.1	3.4	3.1	3.4	3.1	3.4	3.1	3.2	2.9	3.2	3.4	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
6349	3.4	2.9	2.9	2.8	2.6	2.8	3.0	2.7	2.9	3.0	3.0	3.1	3.1	2.6	2.9	2.8	2.7	2.6	2.9	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.6	
6391	3.1	3.3	3.0	3.4	3.2	3.4	3.3	3.3	3.0	3.4	3.4	3.4	3.2	3.2	3.4	3.4	3.2	3.2	3.4	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
ME	3.2	3.14	3.13	2.97	3.05	3.10	3.10	3.16	3.11	3.16	3.14	3.30	3.17	3.11	3.24	3.11	2.94	3.02	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	
SD	0.2	0.24	0.19	0.28	0.24	0.20	0.27	0.26	0.24	0.26	0.24	0.26	0.28	0.26	0.28	0.24	0.26	0.24	0.26	0.24	0.26	0.24	0.26	0.24	0.26	0.24	0.26	0.24	

TABLE - 12: MILK ANALYSIS FOR THE AHI (% BY MASS) CONTENT IN GROUP-I COWS

Cow No.	Days of milk collection in first 28 days period														Days of milk collection in second 28 days period														
	Day 0	1	2	3	4	5	6	7	8	9	10	11	12	13	Day 14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
4131	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
4226	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
4228	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
5191	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
5420	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
5537	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
5979	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
6008	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
6068	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
6117	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
6144	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
6178	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
MEAN	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	
SD	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04

TABLE - 13: MILK ANALYSIS FOR THE ASH (% BY MASS) CONTENT IN GROUP-II COWS ASH

Cow No.	Days of milk collection in first 28 days period												Days of milk collection in second 28 days period															
	Day 1-4				Day 5-8				Day 9-12				Day 13-16				Day 17-20				Day 21-24				Day 25-28			
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	Day 15	Day 16	Day 17	Day 18	Day 19	Day 20	Day 21	Day 22	Day 23	Day 24	Day 25	Day 26	Day 27	Day 28
4215	0.2	0.3	0.3	0.3	0.4	0.8	0.7	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
4225	0.4	0.5	0.6	0.6	0.7	0.6	0.7	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
5540	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
4752	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
5586	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
5918	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
4451	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
6101	0.7	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
8210	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
4221	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
6200	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
4391	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
MEAN	0.37	0.38	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	
SD	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	

TABLE - 13: MILK ANALYSIS FOR THE LACTOSE (% BY MASS) CONTENT IN GROUP-1 COWS

Cow No.	Days of milk collection in first 20 days period										Days of milk collection in second 20 days period																													
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	Day 15	Day 16	Day 17	Day 18	Day 19	Day 20																				
0151	3.7	4.2	4.1	4.7	4.6	4.3	4.5	4.8	4.8	5.1	4.9	4.7	4.3	4.1	4.0	4.1	4.0	4.0	4.0	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
0230	4.8	4.1	4.7	4.1	4.8	4.3	4.5	4.8	4.8	5.1	4.9	4.7	4.3	4.1	4.0	4.1	4.0	4.0	4.0	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1		
0716	4.7	4.7	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
0203	4.6	4.1	4.7	4.1	4.4	4.3	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1			
3406	4.1	4.1	4.2	4.2	4.4	4.6	4.5	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
9017	4.9	4.8	4.7	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		
9019	4.0	4.1	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
0007	4.2	4.0	4.1	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
0608	4.3	4.0	4.1	4.2	4.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1		
0137	4.8	4.4	4.9	4.6	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
0344	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1		
0176	4.8	4.7	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
MEAN	4.57	4.58	4.52	4.73	4.60	4.53	4.53	4.73	4.73	4.89	4.89	4.83	4.78	4.78	4.78	4.78	4.78	4.78	4.78	4.78	4.78	4.78	4.78	4.78	4.78	4.78	4.78	4.78	4.78	4.78	4.78	4.78	4.78	4.78	4.78	4.78	4.78	4.78		
SD	0.40	0.32	0.73	0.46	0.50	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25		

TABLE -15 : MILK ANALYSIS FOR THE TOTAL SOLIDS (% BY MASS) CONTENT IN GROUP-I COWS

Cow No.	Days of milk collection in first 28 days period										Days of milk collection in second 28 days period																												
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	Day 15	Day 16	Day 17	Day 18	Day 19	Day 20																			
4150	11.2	12.4	12.1	12.3	12.5	11.8	12.0	12.2	12.1	12.3	12.2	12.1	12.1	12.1	12.0	12.0	12.0	12.0	12.0	12.0	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1
4176	12.4	12.6	12.2	11.7	12.0	12.8	12.1	12.6	12.1	12.7	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3		
4278	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	
4357	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	
4430	12.2	12.9	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	
4515	12.8	12.4	12.2	12.4	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	
4596	12.0	12.7	12.2	12.8	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	
4682	12.6	12.3	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	
4808	12.1	12.6	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	
4897	12.1	12.3	12.2	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	
4914	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	
5076	12.2	12.8	12.8	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	
5163	12.50	12.80	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	
Σ	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052	1052		

STUDY ON CAT FISH

EXPERIMENTAL DESIGN

Duration	:	28 days
Name of the species	:	<i>Ictalurus punctatus</i> (Cattfish)
Acclimatization	:	Test fish were acclimatized for at least 10 days in water of the quality to be used during the test period.
Total No. of fish	:	300 fish
No. of fish/ treatment	:	100 fish (20 fish / aquarium)
Temperature	:	16-22 °C (60 -70 ° F)
Feed	:	Feed formulated to provide the fish contain 32% crude protein and other supplements and apart from this the cotton seeds (Non transgenic and transgenic) sent by the sponsor was also added which did not exceed 20% of the weight.

Observation period : 28 days

Mortality and behavior of fish in the control group as well as the test groups were observed. Feed was analyzed for its composition at weekly intervals. Fish was provided with the feed formulation at the dose rate of 2% of the body weight. Feed conversion ratio was also calculated. Body weight of the fish was noted initially that is on day 0, on day 14 and 28 respectively.

RESULTS

No mortality or any adverse effects including any behavioral changes were noticed in any of the dose as well as the control groups.

No significant changes were observed in the body weights of the fish of test group when compared to the control group of fish. The feed conversion ratio also did not change and was almost same for the treated as well as control group of fish.

CONCLUSION

Under the condition of this study no adverse effects were noticed in the cat fish given transgenic cotton seed when compared to the fish fed on non transgenic cotton seeds and control diet.

**TOXICOLOGY STUDY
REPORT**

PROJECT NO. : TOX/311

SPONSOR : NATH SEEDS LTD.,
NATH HOUSE,
NATH ROAD,
P. B. NO. 318,
ALRANGABAD-471005.

SUBJECT : EVALUATION OF COTTONSEED MEAL
DERIVED FROM THE TRANSGENIC
COTTONSEED AS A FEED INGREDIENT
FOR CATFISH.

PRODUCT : TRANSGENIC COTTON SEEDS ALONG WITH
NON-TRANSGENIC COTTON SEEDS

MATERIAL DESCRIPTION : BROWN COLOURED COTTON SEEDS

RESULT : Under the condition of this study no adverse effects were
noticed in the cat fish given transgenic cotton seed when
compared to the fish fed on non transgenic cotton seeds and
control diet.

TOTAL NO. OF PAGES : 24

[Signature]
SCIENTIST
PATHOLOGY

[Signature]
ASST. DIRECTOR &
CHIEF, TOXICOLOGY

[Signature]
DIRECTOR

SHRIRAM INSTITUTE FOR INDUSTRIAL RESEARCH
(A Unit of Shriram Scientific & Industrial Research Foundation, Delhi)
19, University Road, Delhi - 110 007

SHRIRAM INSTITUTE

TON-313
TRANSGENIC COTTON SEEDS
EVALUATION OF TRANSGENIC COTTONSEED ON CATFISH

OBJECTIVE

To assess the growth and survival of catfish fed a diet containing cottonseed meal derived from Bt- cottonseed as compared to that of the conventional cotton varieties for use as channel catfish feed. The processed cottonseed meal was incorporated into the catfish feed. The duration of the test was 28 days.

CHARACTERIZATION OF TEST AND CONTROL COTTONSEED :

The test and control cottonseeds will be characterized by the sponsor prior to their use in this study.

EXPERIMENTAL DESIGN

Duration	:	28 days
Acclimatization	:	Test fish were acclimatized for at least 30 days in water of the quality to be used during the test period.
Name of the species	:	<i>Ictalurus punctatus</i> (Catfish)
Total No. of fish to be used	:	300 fish
No. of fish/ treatment	:	100 fish (20 fish /aquarium)
Temperature	:	16-22 °C (60 -70 °F)

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TOX-312
TRANSGENIC COTTON SEEDS
EVALUATION OF TRANSGENIC COTTONSEED ON CATFISH

EXPERIMENTAL PROCEDURE

Identification

Each aquarium was identified by putting a label on it mentioning the name of the study, diet number and aquarium number.

FEED FORMULATION

Feed for the fish was formulated with the composition that was provided by given procedure i.e. approximately 32 % crude protein, supplements for vitamins and minerals, in addition to the cotton seed samples provided by the sponsor which were not exceeding 20 % by weight.

Treatment Diets

Prior to offering the feed of above composition, it was analyzed for the composition. The feed offered was 2 % of body weight.

OBSERVATIONS

Observation period : 28 days

Mortality and behaviour of fish in the control group as well as the test groups were observed. Water temperature and dissolved oxygen were also monitored.

Feed Consumption :

Floating fish pellet meal was provided to the control group fish at the rate of 2 % of body weight and it was noticed that whole feed provided to the fish was consumed. Likewise the test groups were also provided with the feed formulation at the dose rate of 2 % of body weight which was consumed by the fish.

Body Weights :

Weights of fish initially i.e. on day 0, on days 14 and 28 were recorded and the mean weights calculated. The mean weights were considered for further study (Tables : 3-5).

Feed Conversion Ratio :

Feed conversion ratio was calculated on the average body weights of the fish (Table : 6).

Proximate Composition of Diets and Fish Fillets :

The analysis of composition of diets and fish fillets was done weekly (Table : 1).

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TOX-113
TRANSGENIC COTTON SEEDS
EVALUATION OF TRANSGENIC COTTONSEED ON CATFISH

Statistical Method : Probit Analysis

All observed data are recorded and calculated by the above given statistical method. The results are summarised in a tabular form.

RESULTS :

The formulated feed consumed by the fish of the test groups was similar when compared to the fish of the control group.

No significant difference could be noticed in the weight gain of fish of test groups when compared to its control counterparts.

No adverse effects including behavioural changes could be seen in any of the test as well as the control group fish.

Conclusion

Under the condition of this study no adverse effects were noticed in the cat fish given transgenic cotton seed when compared to the fish fed on non transgenic cotton seeds and control diet.

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COMPOSITION OF THE FISH FEED ESTIMATED WEEKLY

TABLE : 1

Parameters	Day 0	Day 7 th	Day 14 th	Day 21 st
Crude Protein % wt/wt	31.00	32.00	31.60	32.00
Moisture % wt/wt	6.80	6.60	6.20	7.30
Crude Fat % wt/wt	7.40	7.80	6.90	7.10
Ash, % wt/wt	1.00	1.40	0.90	1.20
Crude fibre	2.00	2.10	1.90	2.30

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TABLE : 2

MEAN BODY WEIGHT OF FISH AT DIFFERENT INTERVALS
AND AT DIFFERENT

Groups	Day 0	Day 14 th	Day 21 st
Control (given only the fish pellets)	9.82 ± 2.14	10.28 ± 2.02	10.53 ± 2.40
Non-Transgenic	9.91 ± 2.62	10.36 ±	10.64 ±
Transgenic	9.85 ± 1.94	10.24 ± 2.07	10.50 ± 2.41

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 TRANSGENIC COTTON SEEDS
 EVALUATION OF TRANSGENIC COTTONSEED ON CATFISH
 BODY WEIGHT OF FISH GIVEN DIFFERENT DOSES ON DAY '0'
 TABLE : 3

S.No.	Fish wt. on Day '0' Control gp	Fish wt. on Day '0' Non-Transgenic gp	Fish wt. on Day '0' Transgenic gp
1	10.47	9.9	12.10
2	12.90	10.33	6.40
3	7.80	8.51	7.09
4	7.60	6.30	8.56
5	9.40	12.50	11.98
6	12.30	13.00	6.36
7	10.80	6.28	7.35
8	11.90	6.92	10.80
9	12.70	7.05	8.20
10	9.20	6.80	9.60
11	8.90	8.81	11.30
12	10.30	12.90	11.70
13	9.30	21.30	16.95
14	7.80	15.30	11.00
15	10.50	9.80	7.90
16	8.70	6.40	11.05
17	9.20	11.00	10.48
18	10.90	10.90	7.61
19	8.20	9.00	8.23
20	9.80	6.50	8.64
21	10.80	10.30	8.30
22	7.80	7.80	10.75
23	6.90	6.20	7.44

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TRANSGENIC COTTON SEEDS
EVALUATION OF TRANSGENIC COTTONSEED ON CATFISH
BODY WEIGHT OF FISH GIVEN DIFFERENT DOSES ON DAY '0'
TABLE : 3a

S.No.	Fish wt. on Day '0' Control gp	Fish wt. on Day '0' Non-Transgenic gp	Fish wt. on Day '0' Transgenic gp
24	7.20	9.20	11.01
25	8.80	9.90	8.90
26	10.20	8.70	9.98
27	11.20	9.70	7.20
28	16.70	7.80	6.92
29	12.80	7.90	10.28
30	9.50	9.00	7.80
31	8.90	7.60	8.20
32	6.50	9.30	6.90
33	7.40	7.30	10.20
34	9.80	8.60	9.70
35	10.20	9.60	8.50
36	10.60	13.30	10.80
37	10.20	7.40	11.60
38	12.80	6.20	9.50
39	7.50	11.40	6.90
40	12.90	10.50	7.90
41	8.20	12.90	8.40
42	7.60	13.80	12.80
43	8.80	13.60	9.60
44	16.30	11.90	6.30
45	7.50	12.50	10.40
46	9.30	11.20	9.70

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 TRANSGENIC COTTON SEEDS
 EVALUATION OF TRANSGENIC COTTONSEED ON CATFISH
 BODY WEIGHT OF FISH GIVEN DIFFERENT DOSES ON DAY '0'

TABLE 1.5

S.No.	Fish wt. on Day '0' Control gp	Fish wt. on Day '0' Non-Transgenic gp	Fish wt. on Day '0' Transgenic gp
70	6.90	10.50	12.40
71	12.30	8.50	10.70
72	9.20	9.00	10.80
73	8.50	8.40	9.80
74	8.20	12.30	7.90
75	6.90	11.50	12.60
76	7.50	10.90	12.20
77	10.60	9.40	8.80
78	10.50	7.90	8.90
79	12.90	9.70	11.30
80	13.60	14.00	8.50
81	7.20	9.00	10.30
82	8.00	8.20	9.40
83	12.80	7.30	10.70
84	10.40	14.30	11.60
85	6.30	10.20	12.90
86	7.40	7.50	9.60
87	10.50	8.70	10.80
89	7.80	11.30	11.60
90	9.20	7.90	7.80
91	10.80	6.50	10.30
92	12.30	9.60	7.60
93	12.40	6.60	11.20

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FOX-3II
TRANSGENIC COTTON SEEDS
EVALUATION OF TRANSGENIC COTTONSEED ON CATFISH
BODY WEIGHT OF FISH GIVEN DIFFERENT DOSES ON DAY '0'
TABLE - 34

S.No.	Fish wt. on Day '0' Control gp	Fish wt. on Day '0' Non-Transgenic gp	Fish wt. on Day '0' Transgenic gp
93.	12.30	9.20	9.30
94.	12.30	7.60	10.20
95.	9.80	16.10	9.70
96.	7.80	7.30	12.30
97.	8.50	11.20	9.30
98.	12.40	10.00	7.60
99.	10.90	12.00	11.90
100.	10.40	8.90	10.40
Mean	9.82	9.91	9.85
±	=	=	=
S.D	2.14	2.62	1.94

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 TRANSGENIC COTTON SEEDS
 EVALUATION OF TRANSGENIC COTTONSEED ON CATFISH
 BODY WEIGHT OF FISH GIVEN DIFFERENT DOSES ON DAY '14'
 TABLE : 4

S.No.	Fish wt. on Day '14' Control gp	Fish wt. on Day '14' Non/Transgenic gp	Fish wt. on Day '14' Transgenic gp
1	10.62	11.47	7.35
2	9.85	9.23	16.04
3	10.21	10.59	15.64
4	7.86	11.19	9.01
5	8.21	10.82	8.65
6	9.65	14.60	7.60
7	9.52	9.20	10.75
8	10.23	11.70	9.18
9	9.45	10.30	8.25
10	9.63	14.50	10.78
11	9.67	9.26	13.82
12	7.59	9.30	12.35
13	16.60	12.00	13.33
14	15.20	6.90	10.80
15	10.40	10.60	9.30
16	11.60	7.20	12.60
17	9.80	8.54	12.90
18	7.80	11.22	10.80
19	9.00	9.88	7.80
20	6.90	10.10	10.69
21	10.80	12.12	9.20
22	8.50	8.66	10.85
23	12.00	8.95	9.58

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TRANSGENIC COTTON SEEDS EVALUATION OF TRANSGENIC COTTONSEED ON CATFISH BODY WEIGHT OF FISH GIVEN DIFFERENT DOSES ON DAY '14'

TABLE : 4a

S.No.	Fish wt. on Day '14' Control gp	Fish wt. on Day '14' Non-Transgenic gp	Fish wt. on Day '14' Transgenic gp
24	8.00	11.51	10.80
25	9.20	10.97	12.80
26	10.90	9.54	10.60
27	10.00	10.70	11.70
28	11.30	6.46	12.20
29	12.90	8.45	6.70
30	10.90	7.46	8.20
31	8.20	7.64	9.30
32	7.80	11.65	7.20
33	9.00	10.11	9.80
34	10.20	8.67	9.20
35	12.30	11.80	12.90
36	12.60	13.72	12.39
37	11.70	9.43	10.50
38	10.20	7.75	6.80
39	12.20	11.72	10.40
40	8.70	13.73	12.30
41	9.50	12.85	10.50
42	11.40	10.26	9.40
43	7.90	12.40	10.50
44	16.60	10.10	7.80
45	9.30	11.70	12.30
46	11.40	12.30	7.40

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SHRIRAM INSTITUTE
TRANSGENIC COTTON SEEDS
EVALUATION OF TRANSGENIC COTTONSEED ON CATFISH
BODY WEIGHT OF FISH GIVEN DIFFERENT DOSES ON DAY '14'
TABLE : 46

S.No.	Fish wt. on Day '14' Control gp	Fish wt. on Day '14' Non-Transgenic gp	Fish wt. on Day '14' Transgenic gp
47	11.50	10.20	6.80
48	10.60	9.60	9.40
49	9.80	11.60	9.50
50	8.70	11.01	10.80
51	10.30	10.50	8.90
52	9.50	7.70	10.40
53	10.10	11.41	12.80
54	12.30	10.80	8.90
55	10.60	7.80	7.90
56	14.20	12.80	9.00
57	10.40	12.70	8.20
58	12.80	8.50	8.70
59	9.30	13.00	8.00
60	13.00	12.20	12.40
61	10.90	12.04	11.60
62	8.70	12.30	10.90
63	11.60	8.02	13.20
64	10.70	10.30	12.30
65	9.60	12.21	10.60
66	12.30	12.61	7.80
67	8.00	13.01	8.90
68	9.10	8.22	9.60
69	8.10	9.75	9.60

SHRIRAM INSTITUTE
TRANSGENIC COTTON SEEDS
EVALUATION OF TRANSGENIC COTTONSEED ON CATFISH
BODY WEIGHT OF FISH GIVEN DIFFERENT DOSSES ON DAY '14'
TABLE - 4c

S.No.	Fish wt. on Day '14' Control gp	Fish wt. on Day '14' Non-Transgenic gp	Fish wt. on Day '14' Transgenic gp
70	12.60	9.40	8.90
71	13.20	8.89	7.40
72	8.00	9.57	11.40
73	9.10	8.92	8.50
74	8.90	11.10	8.90
75	9.00	12.10	10.60
76	9.80	9.50	11.40
77	10.70	10.61	9.30
78	10.50	8.67	7.80
79	12.10	8.84	10.80
80	12.70	14.55	13.60
81	9.40	8.67	8.90
82	9.10	7.07	10.60
83	13.00	7.89	10.40
84	8.00	15.00	11.30
85	12.10	10.19	8.00
86	8.20	9.90	6.75
87	7.00	8.55	8.40
88	8.00	11.70	9.80
89	9.20	8.39	10.40
90	11.00	9.66	6.74
91	12.00	8.49	9.40
92	7.50	8.10	10.80

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TRANSGENIC COTTON SEEDS
EVALUATION OF TRANSGENIC COTTOSSEED ON CATFISH
BODY WEIGHT OF FISH GIVEN DIFFERENT DOSES ON DAY '14'

TABLE : 40

S.No.	Fish wt. on Day '14' Control gp	Fish wt. on Day '14' Non-Transgenic gp	Fish wt. on Day '14' Transgenic gp
93	12.50	10.03	11.40
94	16.30	9.09	12.80
95	10.00	11.99	12.30
96	8.10	9.89	11.80
97	9.00	11.02	9.50
98	7.60	9.33	10.60
99	9.90	10.02	13.00
100	8.90	9.72	16.30
Mean	10.28	10.36	10.24
±	±	±	±
S.D	2.02		2.07

SHRIRAM INSTITUTE
TRANSGENIC COTTON SEEDS
EVALUATION OF TRANSGENIC COTTONSEED ON CATFISH
BODY WEIGHT OF FISH GIVEN DIFFERENT DOSES ON DAY '28'
TABLE : 5

S.No.	Fish wt. on Day '28' Control gp	Fish wt. on Day '28' Non-Transgenic gp	Fish wt. on Day '28' Transgenic gp
1	12.90	12.24	10.05
2	15.60	8.50	7.95
3	7.80	11.50	9.67
4	10.50	10.60	11.14
5	6.70	11.12	6.65
6	8.50	14.97	7.16
7	16.80	9.94	15.32
8	12.20	11.89	9.62
9	11.30	11.68	10.79
10	12.10	13.00	6.54
11	10.70	11.61	10.93
12	10.70	11.32	8.93
13	6.90	13.40	8.69
14	7.80	7.90	9.24
15	10.55	11.60	10.20
16	15.62	9.10	8.29
17	7.99	9.00	7.79
18	11.25	12.30	9.79
19	12.36	10.20	12.85
20	10.46	10.50	12.60
21	9.40	11.20	8.38
22	8.20	9.00	7.67
23	9.40	10.50	10.39

SHRIRAM INSTITUTE
 TRANSGENIC COTTON SEEDS
 EVALUATION OF TRANSGENIC COTTONSEED ON CATFISH
 BODY WEIGHT OF FISH GIVEN DIFFERENT DOSES ON DAY '28'
 TABLE : 5b

S.No.	Fish wt. on Day '28' Control gp	Fish wt. on Day '28' Non-Transgenic gp	Fish wt. on Day '28' Transgenic gp
47	19.20	9.50	8.89
48	12.30	10.60	9.12
49	16.30	12.00	11.92
50	15.30	9.80	8.29
51	8.20	10.00	10.47
52	9.70	8.20	16.00
53	6.70	10.80	13.08
54	9.80	11.00	6.22
55	12.30	8.00	13.06
56	10.40	11.00	9.77
57	12.90	12.90	14.32
58	13.80	9.00	8.99
59	10.60	14.00	10.32
60	12.10	11.60	8.14
61	9.80	13.60	6.45
62	13.80	11.00	12.28
63	12.30	8.90	12.66
64	10.50	10.80	9.76
65	11.60	13.00	9.18
66	9.90	12.90	8.03
67	13.60	13.20	10.13
68	9.20	9.00	9.97
69	8.80	8.60	10.83

SHRIRAM INSTITUTE
TRANSGENIC COTTON SEEDS
EVALUATION OF TRANSGENIC COTTONSEED ON CATFISH
BODY WEIGHT OF FISH GIVEN DIFFERENT DOSES ON DAY '28'
TABLE : 5c

S.No.	Fish wt. on Day '28' Control gp	Fish wt. on Day '28' Non-Transgenic gp	Fish wt. on Day '28' Transgenic gp
70	7.90	7.70	7.67
71	10.50	6.50	8.75
72	11.70	7.90	12.50
73	12.90	9.80	14.61
74	9.90	12.00	8.20
75	8.20	10.60	9.63
76	9.30	9.60	9.62
77	7.80	12.40	11.29
78	10.50	10.10	8.23
79	10.80	6.90	9.34
80	16.60	13.87	8.83
81	7.40	9.00	9.57
82	9.30	8.00	11.69
83	8.40	15.20	10.18
84	9.40	11.00	12.97
85	12.40	10.70	15.01
86	10.50	9.75	9.68
87	11.12	12.00	8.75
88	13.40	7.95	10.30
89	10.70	8.00	9.62
90	10.30	9.64	9.82
91	10.90	8.00	8.70
92	8.40	11.00	9.10

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TRANSGENIC COTTON SEEDS
EVALUATION OF TRANSGENIC COTTONSEED ON CATFISH
BODY WEIGHT OF FISH GIVEN DIFFERENT DOSES ON DAY '28'
TABLE : 5E

S.No.	Fish wt. on Day '28' Control gp	Fish wt. on Day '28' Non-Transgenic gp	Fish wt. on Day '28' Transgenic gp
95	7.40	9.08	8.26
94	11.70	11.64	11.20
95	10.70	10.00	11.24
96	9.40	10.45	10.30
97	7.80	8.45	14.20
98	13.80	10.00	12.70
99	10.40	8.00	8.90
100	11.70	10.64	17.80
Mean	10.53	10.30	10.70
±	±	±	±
S.D	2.40	3.54	2.41

SHRIRAM INSTITUTE

TOX-313

FOOD CONVERSION RATIOS (FCR) OF DIFFERENT GROUPS
AT THE END OF EXPERIMENTATION

TABLE : 6

S.No.	GROUP	FCR (in %)
1.	Control (Given only the fish pellets)	1.50
2.	Non-Transgenic group	1.32
3.	Transgenic group	1.40

The daily feed provided as a percent of total weight.
Since the temperature was 60 - 70° F the feed was given at 2.0 percent
of the body weight of fish.

TEST CERTIFICATE

SHRIRAM INSTITUTE

TOX-313

AVERAGE FEED CONSUMPTION DATA OF FISH

TABLE : 7

	Day 0-6		Day 7-13		Day 14-20		Day 21-28	
	Feed given (gms)	Feed Consumed (gms)						
Control (given the pellets only) Group	20	19.00	20	20.0	20	19.0	20	20.0
Non-Transgenic Group	20	20.0	20	18.0	20	19.0	20	18.0
Transgenic Group	20	19.00	20	18.0	20	20.0	20	18.0