

# **Appendix I**

## **Investigation on the Attributes of Cloned Bovine Products**

The Japanese Research Institute for Animal Science in Biochemistry and Toxicology provided an unpublished bound report “Investigation on the Attributes of Cloned Bovine Products” by the Japan Livestock Technology Association (Japan, 2002). The 489 page report, provided in the original Japanese, and was accompanied by an eight page August 2002 English-language summary.

This appendix contains a translation of the first three pages of the bound report and the eight page English summary. These are followed by tables from the original bound report. The tables present the results of a feeding study in which rats were fed diets containing freeze dried milk or freeze dried beef from ordinary cattle and clone cattle at concentrations of 0, 2.5, 5, or 10% of the diet for 28 days. General signs, body weight, food consumption, urinalysis, sensory and reflex function, spontaneous movement frequency, general function, reproductive cycle, hematology at autopsy, blood chemistry, organ weights, pathology and histopathology were compared between groups. English-language tables were provided in the original Japanese-language report with the results. These tables are included in this appendix.

*This page intentionally left blank.*

**English language translation of the first three  
pages of the report “Investigation on the  
Attributes of Cloned Bovine Products”**

*This page intentionally left blank.*

A project aided by the Agriculture and  
Livestock Industries Corporation

**PROJECT REPORT OF AN INVESTIGATION ON THE PROPERTIES  
OF PRODUCTS FROM CLONED CATTLE**  
(An Urgent Study Project for the Utilization of Cloned Cattle)  
(1999 – 2001)

September 2002

Japan Livestock Technology Association

## **Results of an investigation on the properties of products from cloned cattle**

Rapid advances have been made in the application of cloning technology in cattle multiplication. Products from embryonic clones of cattle are already on the market as safe foods. The Ministry of Health, Labor and Welfare (MHLW) is currently gathering data on the safety of products from somatic cell cloned cattle and has released an interim report which states that so far there is no reason to anticipate safety-related problems.

Cloning technology is expected to advance further and come into wide use as a technology that can provide inexpensive meat, milk, etc to consumers. However, for this to happen, it is essential for the meat and milk of cloned cattle to become widely accepted by consumers as safe, high-quality commodities.

This Association conducted various investigations on cloned cattle, with grants from the Agriculture and Livestock Industries Corporation (ALIC), during 1999 to 2001. An investigation on the properties of products from cloned cattle, which was a part of these investigations, was commissioned to the Research Institute for Animal Science in Biochemistry and Toxicology (RIAS).

The objective of this investigation was to collect data that would confirm the safety of products from embryonic clones of cattle, which are already in use as food items, and also data that would be useful in evaluating the safety of products from somatic cell clones. For this purpose, the properties of the blood, and the composition of nutritional components such as proteins, lipids, amino acids and fatty acids of raw milk and meat were analyzed and compared among ordinary cattle, embryonic clones and somatic cell clones of Holstein and Black Japanese breeds. Digestibility studies with artificial digestive fluid and with rats, allergenicity and mutagenicity (micronucleus) tests with mice, and a 14-week feeding study with rats were also conducted and the digestibility, allergenicity, and mutagenicity of the products, and their effects on the growth, functions and morphology of the test animals were compared. The results of none of the analyses or tests showed any significant differences between products from ordinary cattle and the two types of cloned cattle. Also, no harmful effect attributable to the raw milk or meat of the two types of clones was observed.

September 10, 2002

Cloned Cattle Investigation Committee  
Japan Livestock Technology Association

– Contents –

- Results of an investigation on the properties of products from cloned cattle  
Urgent study project on the utilization of cloned cattle – List of the “Cloned Cattle Investigation Committee” members
1. Summary results of the investigation on the properties of products from cloned cattle
  2. Tests on the properties of blood of cattle covered by the investigation on the properties of products from cloned cattle
  3. Analysis of nutritional components of raw milk and meat of cloned cattle
  4. Allergenicity tests of raw milk and meat of cloned cattle by the mouse abdominal wall method
  5. Studies on digestibility of raw milk and meat of cloned cattle
  6. Mouse micronucleus test on raw milk and meat of cloned cattle
  - 7-1 14-week feeding study on rats, with raw milk of cloned cattle
  - 7-2 Preliminary study for the “14-week feeding study on rats, with raw milk of cloned cattle” – Raw milk dry powder mixing concentration-setting study
  - 8-1 14-week feeding study on rats, with beef from cloned cattle
  - 8-2 Preliminary study for the “14-week feeding study on rats, with beef from cloned cattle” – Dry meat powder mixing concentration-setting study

*This page intentionally left blank.*

**English language summary of the report  
“Investigation on the Attributes of Cloned  
Bovine Products”**

*This page intentionally left blank.*

Press Release

August 13, 2002

Livestock Technology Division,  
Livestock Industry Department,  
Agricultural Production Bureau,  
Ministry of Agriculture,  
Forestry and Fisheries

RE: Outline of Investigative Results on the Attributes of Cloned Bovine Products

An interim report of the Ministry of Health and Welfare (MHW) released in June 2000 concerning the safety of foods made from cloned cattle states, "There is no scientific basis for fearing the safety of foods", and it recommended that foods derived from BNT cloned cattle be sold with labeling to that effect (optional labeling). The interim report also stated that, "It would be desirable to obtain data on a greater number of cloned cattle that would support safety." Because somatic cloning technology is a newer technology, the Ministry of Agriculture, Forestry and Fisheries (MAFF) is requesting self-restraint on the shipment of SCNT cloned cattle. The Ministry of Health, Labour and Welfare (MHLW: a new Ministry changed from MHW) are currently conducting an investigative study on safety.

In response, the Research Institute for Animal Science in Biochemistry and Toxicology has been conducting a study on the attributes of cloned bovine products (emergency study project on cloned bovine usage). The results of this study have now been gathered so a summary is attached separately.

It is intended that the results of this study will be submitted as reference material for the "investigative research on the safety of animal foods that use cloning technology" currently being conducted at the MHLW.

For further information, please contact:  
Yoshitake  
Livestock Breeding Technology Center  
Livestock Technology Division,  
Livestock Industry Department,  
Agricultural Production Bureau,  
Ministry of Agriculture, Forestry and Fisheries  
TEL: 03-3502-8111 (ext. 3911)  
Direct TEL: 03-3591-3656  
FAX: 03-3593-7233

August 13, 2002  
Research Institute for Animal  
Science in Biochemistry and Toxicology

## Outline of Investigation on the Attributes of Cloned Bovine Products

Commissioned by the Livestock Technology Association from FY1999, we conducted an investigation on the attributes of cloned bovine products. The following are the results of this investigation.

### 1. Objectives

To conduct an investigation on the blood attributes of cloned cattle (BNT cloned cattle or SCNT cloned cattle), and analyze the components of cloned bovine products (milk and beef), as well as to conduct a study on animal feeding of feed additives from cloned cattle, and obtain data comparing cloned bovine products and existing foods (products from ordinary cattle produced by artificial insemination, etc).

### 2. Outline of investigation

#### (1) Blood test

##### (Material and method)

Blood was sampled from ordinary cattle and cloned cattle at 3, 6, and 9 months of pregnancy and 3 and 6 weeks after birth in the case of dairy cattle (Holstein), and 3 to 4 times during a period from 21 to 28 weeks after birth in the case of beef cattle (*kuroge-wagyu*). The sampled blood was subject to hematological testing (12 items including red blood cell count, white blood cell count, and hemoglobin) and biochemical examination of blood (25 items including total protein, and total cholesterol) and compared.

##### (Results)

None of the animals showed abnormalities in performance status. There were also no biologically significant differences\* in any of the test values between ordinary cattle and cloned cattle, for both the dairy and beef types.

\* A biologically significant difference means a difference that could possibly have an effect on factors such as health and survival evident between the study groups. There are no problems if a biologically significant difference and statistically significant difference are in accord, but even if there is a statistically significant difference between the study groups in general, and that the difference is within the range of normal values it is unlikely that health would be affected, so one could not say that a biologically significant difference exists. In the investigative report, biologically significant difference was studied in addition to statistically significant difference. The same applies hereafter.

#### (2) Analytical study of milk and meat components

#### (Material and method)

The general components (water content, protein, lipids, and sugars), amino acids (18 types), and fatty acid (21 types) content (content per 100 g) in milk and slices of meat (9 sites) sampled from ordinary cattle and cloned cattle were measured and compared.

#### (Results)

Although there were slight variations seen among individual cattle, no biologically significant differences were evident in the general components, amino acids, and fatty acid content between ordinary cattle and cloned cattle for both milk and different sites of meat (Table 1).

### (3) Milk and meat digestion study

#### (Material and method)

A study of digestion of pieces of meat sampled from ordinary cattle and cloned cattle by artificial gastric juice and intestinal juice, and a study of digestion of milk and meat that had been frozen, dried, and powdered (freeze-dried food) and added to feed, using rats were conducted, and the digestion rates that were regarded as parameters of protein were compared.

#### (Results)

There were no biologically significant differences in the rates of digestion of the feed additives due to artificial gastric juice and intestinal juice using rats between ordinary cattle and cloned cattle (Tables 2 and 3).

### (4) Allergen testing of milk and meat by mouse abdominal wall method

#### (Material and method)

We sensitized mice with an intraperitoneal injection of extract from freeze-dried milk and meat slices sampled from ordinary cattle and cloned cattle. Fourteen days later we retracted the abdomen and induced an allergic reaction by re-injection in the abdominal wall. Allergen activity was compared based on the extent of vascular permeability (diameter of dye leakage) seen due to the sensitization treatment.

#### (Results)

For both milk and meat slices there were no statistically significant differences in allergen activity between ordinary cattle and cloned cattle (Table 4).

### (5) Feeding test by the supply of a combination feed of milk and meat using rats

#### (Material and method)

Freeze-dried milk and meat of ordinary cattle and cloned cattle were each combined with basic feed at concentrations of 2.5%, 5%, and 10% in the case of freeze-dried milk, and 1%, 2.5%, and 5% in the case of freeze-dried meat, and fed to rats (20 per group (10 males and 10 females)) for 14 weeks.

The general sign, body weight, food consumption, urinalysis (8 items), sensory and reflex function, spontaneous movement frequency, general function, reproductive cycle, hematology at autopsy (11 items), blood chemistry (23 items), autopsy and organ weights (brain, pituitary gland, cerebral gland, thyroid gland, heart, lungs, liver, pancreas, adrenal bodies, and reproductive organs) of rats given the feed were compared among a basic feed group, ordinary cattle group, and cloned cattle group.

(Results)

There were no biologically significant differences in each of the items observed and tested over time in rats at any concentration of feed additive for milk and meat between ordinary cattle and cloned cattle (Table 5).

(6) Mutagenicity by milk and meat supply using mice (micronucleus test)

(Material and method)

Feed produced in the feed test by the supply of a combination feed of milk and meat in (5) was given to mice for 14 days whereupon the incidence of bone marrow micronucleus-possessing erythrocytes appearing was tested (micronucleus) and mutagenicity (clastogenicity) was studied.

(Results)

Clastogenicity was negative and mutagenicity was not evident for milk and meat feed additives from ordinary cattle and cloned cattle (Table 6).

### 3. Summary

The above results revealed no biologically significant differences in component analysis testing and feed additive animal testing between products of BNT cloned cattle and SCNT cloned cattle (milk and meat), and the products of ordinary cattle.

**Table 1. General components**

## (1) Milk

Classification	Cattle No.	Protein (g/100 g)	Fats (g/100 g)	Sugars (g/100 g)	Ash content (g/100 g)	Water content (g/100 g)	Calcium (mg/100 g)	Cholesterol (mg/100 g)
Ordinary cattle	Min. value	3.0	2.2	4.6	0.7	88.1	100	8
	Max value	3.4	3.3	4.6	0.7	89.7	110	10
	Mean value	3.3	2.7	4.6	0.7	88.9	105	9
BNT cloned cattle	No.1	2.9	2.3	3.0	0.8	91.1	95	9
	No.2	2.9	3.6	3.5	0.7	89.3	105	9
SCNT cloned cattle	No.1	3.1	4.3	4.6	0.7	87.4	120	9
	No.2	3.3	2.6	4.4	0.7	89.1	115	11
	No.3	3.3	3.1	4.5	0.7	88.5	115	10

Note: The analytical values for each animal are the mean of the analytical values for milk sampled at two points – 3 weeks and 6 weeks after delivery.

## (2) Meat

Classification	Cattle No.	Protein (g/100 g)	Fats (g/100 g)	Sugars (g/100 g)	Ash content (g/100 g)	Water content (g/100 g)	Cholesterol (mg/100 g)
Ordinary cattle	Min. value	17.8	13.8	0.4	0.9	58.0	50
	Max value	19.6	22.9	0.8	1.0	64.8	68
	Mean value	18.4	19.3	0.6	0.9	60.8	59
BNT cloned cattle		17.4	21.2	0.4	0.9	60.2	56
SCNT cloned cattle		16.8	23.8	0.5	0.9	57.9	68

Note: The analytical value for each animal is the mean value of the analytical values of 9 sites: shoulder, chuck loin, rib loin, loin end, brisket, round, silver side, rump, and tender loin.

**Table 2. Rates of meat digestion by artificial digestive juices**

Digestive juice	Sample	Rate of digestion after the start of incubation						
		Course	Start	0.75 hr	1.5 hr	3 hr	6 hr	12 hr
Artificial gastric juice	Ordinary beef	0	68	79	-	95	90	
	Somatic cloned beef	0	59	78	-	91	90	
Artificial intestinal juice	Ordinary beef	0	-	20	40	66	67	
	Somatic cloned beef	0	-	28	38	67	63	

Note: The digestion rate shows the protein rate of digestion.

**Table 3. Digestion rates of milk and meat in rats**

Sample	Test group	Number of animals	Digestion rate (mean $\pm$ standard deviation)
Milk	Ordinary cattle	5	83.0 $\pm$ 2.6
	BNT cloned cattle	5	82.7 $\pm$ 2.0
	SCNT cloned cattle	5	81.3 $\pm$ 3.4
Meat	Ordinary cattle	5	83.8 $\pm$ 6.6
	BNT cloned cattle	5	82.3 $\pm$ 4.7
	SCNT cloned cattle	5	84.9 $\pm$ 3.6

Note: Milk and meat were each freeze-dried and combined in feed. The digestion rate shows the protein digestion rate.

**Table 4. Allergen study of milk and meat by mouse abdominal wall method**

Sample	Test group	Number of animals	Diameter of dye leakage (mm) (mean $\pm$ SD)
Milk	Ordinary cattle	Control group Test group	7.0 $\pm$ 3.7 18.0 $\pm$ 2.9
	BNT cloned cattle	Control group Test group	4.7 $\pm$ 3.2 18.0 $\pm$ 3.9
	SCNT cloned cattle	Control group Test group	4.9 $\pm$ 4.6 17.9 $\pm$ 4.2
Meat	Ordinary cattle	Control group Test group	5.3 $\pm$ 5.0 13.0 $\pm$ 5.9
	BNT cloned cattle	Control group Test group	7.0 $\pm$ 4.9 12.5 $\pm$ 3.5
	SCNT cloned cattle	Control group Test group	5.7 $\pm$ 4.2 13.1 $\pm$ 5.0

Note: Milk and meat were each freeze-dried and the extracts were used as samples. The test groups underwent sensitization treatment and elicitation, while the control groups underwent elicitation only.

**Table 5. Feed study of milk and meat by formula feed supply using rats**

(1) Changes in rat body weight by milk formula feed supply (mean $\pm$  standard deviation)

Study group	Number of animals	Feeding period (weeks)										Amount of body weight increase in 1-14 weeks (g)	
		1	2	3	4	5	6	8	10	12	14		
Male	Basal diet	10	146 $\pm$ 6	189 $\pm$ 20	255 $\pm$ 34	299 $\pm$ 45	344 $\pm$ 59	373 $\pm$ 58	428 $\pm$ 56	448 $\pm$ 58	516 $\pm$ 47	547 $\pm$ 77	401 $\pm$ 76
	Ordinary cattle High concentration (10%)	10	146 $\pm$ 6	194 $\pm$ 11	260 $\pm$ 13	304 $\pm$ 17	350 $\pm$ 19	378 $\pm$ 22	426 $\pm$ 36	475 $\pm$ 43	515 $\pm$ 43	544 $\pm$ 48	398 $\pm$ 48
	BNT cloned cattle High concentration (10%)	10	146 $\pm$ 6	175 $\pm$ 19	245 $\pm$ 15	295 $\pm$ 14	333 $\pm$ 18	367 $\pm$ 16	425 $\pm$ 22	462 $\pm$ 34	503 $\pm$ 41	530 $\pm$ 44	384 $\pm$ 41
	SCNT cloned cattle High concentration (10%)	10	146 $\pm$ 7	196 $\pm$ 10	261 $\pm$ 17	310 $\pm$ 23	353 $\pm$ 27	379 $\pm$ 30	432 $\pm$ 41	473 $\pm$ 41	519 $\pm$ 43	545 $\pm$ 48	399 $\pm$ 43
Female	Basal diet	10	117 $\pm$ 5	150 $\pm$ 6	184 $\pm$ 12	208 $\pm$ 9	229 $\pm$ 10	242 $\pm$ 10	267 $\pm$ 16	283 $\pm$ 15	304 $\pm$ 18	310 $\pm$ 20	193 $\pm$ 18
	Ordinary cattle High concentration (10%)	10	118 $\pm$ 5	152 $\pm$ 7	181 $\pm$ 7	209 $\pm$ 12	234 $\pm$ 16	247 $\pm$ 15	273 $\pm$ 20	298 $\pm$ 21	316 $\pm$ 28	329 $\pm$ 40	211 $\pm$ 42
	BNT cloned cattle High concentration (10%)	10	119 $\pm$ 7	157 $\pm$ 11	186 $\pm$ 12	208 $\pm$ 22	223 $\pm$ 27	244 $\pm$ 26	272 $\pm$ 19	292 $\pm$ 21	313 $\pm$ 26	326 $\pm$ 30	207 $\pm$ 27
	SCNT cloned cattle High concentration (10%)	10	118 $\pm$ 7	151 $\pm$ 12	181 $\pm$ 12	209 $\pm$ 13	229 $\pm$ 16	247 $\pm$ 19	274 $\pm$ 18	293 $\pm$ 19	317 $\pm$ 21	330 $\pm$ 33	213 $\pm$ 33

Note: Aside from studying a 10% milk powder concentration, 10 cattle each were also fed a low concentration (2.5%) and a medium concentration (5%), but no significant differences were noted.

(2) Changes in rat body weight by meat formula feed supply (mean $\pm$  standard deviation)

Study group	Number of animals	Feeding period (weeks)										Amount of body weight increase in 1-14 weeks (g)	
		1	2	3	4	5	6	8	10	12	14		
Male	Basal diet	10	143 $\pm$ 5	216 $\pm$ 12	279 $\pm$ 14	336 $\pm$ 16	382 $\pm$ 18	426 $\pm$ 22	489 $\pm$ 31	534 $\pm$ 37	560 $\pm$ 42	590 $\pm$ 50	447 $\pm$ 51
	Ordinary cattle High concentration (5%)	10	143 $\pm$ 5	221 $\pm$ 9	284 $\pm$ 17	337 $\pm$ 24	386 $\pm$ 30	432 $\pm$ 36	492 $\pm$ 44	541 $\pm$ 55	575 $\pm$ 62	604 $\pm$ 65	462 $\pm$ 65
	BNT cloned cattle High concentration (5%)	10	143 $\pm$ 5	219 $\pm$ 10	286 $\pm$ 14	343 $\pm$ 18	392 $\pm$ 21	431 $\pm$ 26	488 $\pm$ 34	535 $\pm$ 39	564 $\pm$ 43	591 $\pm$ 49	448 $\pm$ 51
	SCNT cloned cattle High concentration (5%)	10	143 $\pm$ 6	215 $\pm$ 9	278 $\pm$ 14	336 $\pm$ 20	392 $\pm$ 29	435 $\pm$ 35	499 $\pm$ 48	551 $\pm$ 60	581 $\pm$ 70	613 $\pm$ 80	469 $\pm$ 76
Female	Basal diet	10	120 $\pm$ 4	167 $\pm$ 14	198 $\pm$ 15	228 $\pm$ 18	253 $\pm$ 26	272 $\pm$ 26	290 $\pm$ 26	313 $\pm$ 33	330 $\pm$ 38	338 $\pm$ 35	218 $\pm$ 38
	Ordinary cattle High concentration (5%)	10	120 $\pm$ 4	169 $\pm$ 11	200 $\pm$ 12	230 $\pm$ 15	254 $\pm$ 19	274 $\pm$ 18	297 $\pm$ 23	316 $\pm$ 28	331 $\pm$ 31	341 $\pm$ 30	221 $\pm$ 30
	BNT cloned cattle High concentration (5%)	10	120 $\pm$ 5	171 $\pm$ 8	201 $\pm$ 10	236 $\pm$ 15	260 $\pm$ 20	280 $\pm$ 23	311 $\pm$ 29	330 $\pm$ 27	347 $\pm$ 35	361 $\pm$ 40	241 $\pm$ 39
	SCNT cloned cattle High concentration (5%)	10	120 $\pm$ 4	167 $\pm$ 8	195 $\pm$ 9	227 $\pm$ 11	250 $\pm$ 12	268 $\pm$ 12	292 $\pm$ 16	310 $\pm$ 19	329 $\pm$ 20	336 $\pm$ 20	216 $\pm$ 17

Note: Aside from studying a 5% meat powder concentration, 10 cattle each were also fed a low concentration (1.0%) and a medium concentration (2.5%), but no significant differences were noted.

**Table 6. Mutagenicity by the supply (14 days) of milk and meat using mice (micronucleus test)**

(1) Milk

Test group	Number of animals	Incidence (%) of micronucleus appearance (Min – max)		Polychromatic erythrocyte rate (%) (Min – max)		Assessment
Negative control group (basal diet)	6	0.27±0.10	(0.1 – 0.4)	49.2±6.6	(42.2 – 57.1)	
Ordinary cattle						
2.5% group	6	0.22±0.17	(0.0 – 0.4)	49.4±3.8	(43.1 – 53.1)	Negative
5% group	6	0.20±0.14	(0.0 – 0.4)	45.7±5.0	(36.8 – 50.3)	Negative
10% group	6	0.12±0.10	(0.0 – 0.2)	44.5±7.5	(35.4 – 56.9)	Negative
BNT cloned cattle						
2.5% group	6	0.30±0.14	(0.1 – 0.5)	44.0±6.7	(36.5 – 55.2)	Negative
5% group	6	0.25±0.12	(0.1 – 0.4)	47.4±8.1	(36.5 – 56.3)	Negative
10% group	6	0.17±0.08	(0.1 – 0.3)	44.7±8.4	(32.3 – 56.8)	Negative
SCNT cloned cattle						
2.5% group	6	0.22±0.13	(0.0 – 0.3)	49.7±7.4	(35.8 – 56.3)	Negative
5% group	6	0.28±0.15	(0.1 – 0.5)	49.5±7.8	(41.2 – 60.9)	Negative
10% group	6	0.25±0.05	(0.2 – 0.3)	44.0±6.2	(34.2 – 52.8)	Negative
Positive control group (Mitomycin C)	6	6.02±1.03**	(4.6 – 7.6)	34.6±5.5	(26.3 – 40.3)	Positive

(2) Meat

Test group	Number of animals	Incidence (%) of micronucleus appearance (Min – max)		Polychromatic erythrocyte rate (%) (Min – max)		Assessment
Negative control group (basal diet)	6	0.20±0.18	(0.0 – 0.5)	47.7±9.7	(30.2 – 59.7)	
Ordinary cattle						
1% group	6	0.17±0.12	(0.1 – 0.4)	50.0±9.1	(37.9 – 61.3)	Negative
2.5% group	6	0.13±0.08	(0.0 – 0.2)	47.3±13.1	(22.3 – 60.2)	Negative
5% group	6	0.12±0.15	(0.0 – 0.3)	46.8±10.5	(37.2 – 63.5)	Negative
BNT cloned cattle						
1% group	6	0.20±0.06	(0.1 – 0.3)	51.0±7.3	(41.3 – 59.3)	Negative
2.5% group	6	0.23±0.14	(0.0 – 0.4)	47.1±4.3	(40.6 – 51.1)	Negative
5% group	6	0.12±0.08	(0.1 – 0.2)	49.6±9.6	(37.9 – 61.9)	Negative
SCNT cloned cattle						
1% group	6	0.18±0.10	(0.1 – 0.3)	48.3±8.4	(35.6 – 55.1)	Negative
2.5% group	6	0.22±0.10	(0.1 – 0.4)	51.7±7.3	(44.3 – 63.9)	Negative
5% group	6	0.22±0.08	(0.1 – 0.3)	48.4±8.1	(38.4 – 58.1)	Negative
Positive control group (Mitomycin C)	6	6.95±1.56**	(4.1 – 8.4)	25.7±6.5	(19.4 – 36.4)	Positive

Note: Milk and meat were freeze-dried and powdered and combined in feed. The positive control group was administered a single dose of 2 mg/kg of mitomycin C intraperitoneally. Values were shown as mean±standard deviation.

\*\* denotes a significant difference at p<0.01 against the positive control group.

## **Results of a 28-Day Feeding Study in Rats Fed Diets Containing Freeze Dried Milk or Beef from Ordinary Cattle and Clone Cattle**

*This page intentionally left blank.*

Table 1 Analyzed nutrient composition of the milk powder

Macronutrient (%)	Vitamin	(mg/100g)	Mineral (mg/100g)
Crude protein 23.3	A	113IU/100g	C a 1410
Crude fat 23.4	B <sub>1</sub>	0.27	P 723
Carbohydrate 45.0	B <sub>2</sub>	1.11	K 2010
Crude fiber 0.0	B <sub>6</sub>	0.17	N a 195
Ash 5.4	B <sub>12</sub>	0.0017	M g 79.2
Water 2.9	D <sub>3</sub>	ND	F e 0.326
	E	0.4	Z n 3.069
	K <sub>1</sub>	ND	C u 0.064
	K <sub>2</sub>	0.0070	S 220
	Niacin	0.86	M n 0.073
	Pantothenic acid	2.90	I 0.07
	Folic acid	0.05	S e 0.023
	Biotin	0.00919	M o ND
	Choline	0.10 (%)	

Table 2-1 Composition of the milk powder-contained diets

Ingredient	Basal diet	5% diet	10% diet	20% diet	(g/kg diets)
Milk powder		50.000	100.000	200.000	
Cornstarch	397.486	378.180	358.872	320.258	
Casein (93.5% protein)	200.000	187.540	175.080	150.160	
Alfa-cornstarch	132.000	125.588	119.177	106.355	
Sucrose	100.000	100.000	100.000	100.000	
Soybean oil	70.000	58.300	46.600	23.200	
Cellulose	50.000	50.000	50.000	50.000	
Mineral Mix *	35.000	35.000	35.000	35.000	
Vitamin Mix *	10.000	10.000	10.000	10.000	
L-Cystine	3.000	3.000	3.000	3.000	
Choline Bitartrate (41.1% choline)	2.500	2.378	2.257	2.013	
t-Butylhydroquinone	0.014	0.014	0.014	0.014	
Caloric value (kcal)	395	396	397	398	
Crude protein (%)	18.7	18.7	18.7	18.7	
Crude fat (%)	7.0	7.0	7.0	7.0	
Carbohydrate (%)	64.4	64.6	64.8	65.1	
Crude fiber (%)	5.0	5.0	5.0	5.0	

\* : Ingredients of the mineral mix and vitamin mix are shown in table 2-2.

Table 2-2 Ingredients of the mineral mix and vitamin mix for the milk powder-contained diet

Ingredients	Contents (%)	Mineral Mix				Vitamin Mix				(g/kg Mix)
		Basal diet	5% diet	10% diet	20% diet	Ingredients	Basal diet	5% diet	10% diet	
<b>ESSENTIAL MINERALS</b>										
Calcium Carbonate	Ca : 40.04	357.00	306.663	256.326	155.652	Vitamin A Palmitate (500,000IU/g)	0.800	0.687	0.574	0.348
Potassium Phosphate (monobasic)	P : 22.76	198.00	161.722	127.570	59.390	Thiamine HCl (B <sub>1</sub> )	0.800	0.590	0.570	0.550
Potassium Citrate H <sub>2</sub> O	K : 28.73					Riboflavin (B <sub>2</sub> )	0.800	0.540	0.490	0.380
	K : 36.16	124.150 *	93.211	62.174		Pyridoxine HCl (B <sub>6</sub> )	0.700	0.690	0.680	0.670
Sodium Chloride	Na : 39.34	74.00	66.822	59.570	45.140	Vitamine B <sub>12</sub> (0.1%)	2.500	2.400	2.300	2.200
Potassium Sulfate	S : 18.39	68.35 *	51.263	34.175		Vitamin D <sub>3</sub> (400,000IU/g)	0.250	0.250	0.250	0.250
Magnesium Oxide	Mg : 60.32	24.00	22.118	20.282	16.565	Vitamin E Acetate (500IU/g)	15.000	15.000	15.000	15.000
Ferric Citrate	Fe : 16.50	6.06	6.06	6.06	5.887	Vitamin K <sub>1</sub>	0.075	0.075	0.074	0.074
Zinc Carbonate	Zn : 52.14	1.65	1.54	1.485	1.32	Niacin	3.000	3.000	3.000	3.000
Manganese Carbonate	Mn : 47.79	0.63	0.630	0.630	0.624	Calcium Pantothenate	1.600	1.500	1.300	1.000
Cupric Carbonate	Cu : 57.47	0.30	0.30	0.295	0.285	Polic Acid	0.200	0.200	0.200	0.190
Potassium Iodate	I : 59.30	0.01	0.009	0.007	0.003	Biotin	0.020	0.020	0.019	0.018
Sodium Selenate	Se : 41.79	0.01025	0.00957	0.00888	0.00752	Sucrose finely powdered	74.655	975.048	975.543	976.320
Ammonium Paramolybdate 4H <sub>2</sub> O	Mo : 54.34	0.00795	0.00795	0.00795	0.00795					
<b>NON-ESSENTIAL MINERALS</b>										
Sodium Metasilicate 9H <sub>2</sub> O	Si : 9.88	1.45	1.45	1.45	1.45					
Chromium Potassium Sulfate 12H <sub>2</sub> O	Cr : 10.42	0.275	0.275	0.275	0.275					
Lithium Chloride	Li : 16.38	0.0174	0.0174	0.0174	0.0174					
Boric Acid	B : 17.50	0.0815	0.0815	0.0815	0.0815					
Sodium Fluoride	F : 45.24	0.0635	0.0635	0.0635	0.0635					
Nickel Carbonate	Ni : 45.00	0.0318	0.0318	0.0318	0.0318					
Ammonium Vanadate	V : 43.55	0.0066	0.0066	0.0066	0.0066					
Sucrose finely powdered		145.90600	287.71868	429.48337	713.18273					

\* : Composition is differ from that of the AIN standard diet.

The mineral mix and vitamin mix for each composition was designed to reflect the mineral (essential minerals) and vitamin contents of the milk powder at each additional level.

Table 3 Body weights of male rats fed the milk powder-contained diet in a 28day dose range-finding test

Conc. in diet	Number of animals	Day						(g)
			1	7	14	21	28	Gain 0~28
0%	6		125 ± 3	187 ± 6	239 ± 7	290 ± 10	331 ± 13	205 ± 12
5%	6		125 ± 3	183 ± 6	241 ± 11	297 ± 16	340 ± 22	215 ± 21
10%	6		125 ± 3	183 ± 7	239 ± 12	290 ± 18	332 ± 20	208 ± 17
20%	6		125 ± 4	183 ± 9	238 ± 12	281 ± 21	320 ± 26	196 ± 27

Each value is expressed as mean±S.D.

Table 4 Body weights of female rats fed the milk powder-contained diet in a 28day dose range-finding test

Conc. in diet	Number of animals	Day						(g)
			1	7	14	21	28	Gain 0~28
0%	6		116 ± 5	150 ± 5	177 ± 6	202 ± 7	224 ± 12	109 ± 11
5%	6		116 ± 5	153 ± 16	178 ± 17	203 ± 21	229 ± 29	113 ± 26
10%	6		115 ± 4	151 ± 9	177 ± 11	202 ± 13	226 ± 14	111 ± 10
20%	6		117 ± 8	153 ± 10	182 ± 17	207 ± 22	229 ± 25	112 ± 18

Each value is expressed as mean±S.D.

Table 5 Food consumption of male rats fed the milk powder-contained diet in a 28day dose range-finding test

Conc. in diet	Number of animals	(g)			
		Week 1	2	3	4
0%	6	16 ± 0	19 ± 2	20 ± 1	20 ± 1
5%	6	16 2	19 1	20 1	20 0
10%	6	15 2	19 1	20 2	20 2
20%	6	15 0	18 0	17 3	19 1

Each value is expressed as mean±S.D.

Table 6 Food consumption of female rats fed the milk powder-contained diet in a 28day dose range-finding test

Conc. in diet	Number of animals	(g)			
		Week 1	2	3	4
0%	6	11 ± 1	14 ± 0	15 ± 1	16 ± 2
5%	6	12 1	14 1	15 3	16 3
10%	6	11 2	13 2	14 1	15 2
20%	6	11 2	14 2	15 2	15 1

Each value is expressed as mean±S.D.

Table 7 Urinary findings of male rats fed the milk powder-contained diet in a 28day dose range-finding test

Conc. in diet	No. of animals	Color PY	Cloudy		pH						Protein					Glucose					
			-	+	5.0	6.0	6.5	7.0	7.5	8.0	8.5	-	*	+	++	+++	-	*	+	++	+++
0%	6	6	6		3	2	1					1	3	2			6				
5%	6	6	6		4	2						1	3	2			6				
10%	6	6	6		1	5						2	4				6				
20%	6	6	6		4	2						1	5				6				

  

Conc. in diet	No. of animals	Ketone body					Occult blood					Urobilinogen				Bilirubin					
		-	*	+	++	+++	-	*	+	++	+++	0.1	1	2	4	8	-	+	++	+++	
0%	6	4	2				6					6					6				
5%	6	4	2				6					6					6				
10%	6	3	3				6					6					6				
20%	6	4	2				6					6					6				

Color : PY(pale yellow)

Cloudy : - (negligible), + (cloudy)

Protein : - (negligible), ±(15~80mg/dL), +(30mg/dL), ++(100mg/dL), +++(300mg/dL)

Glucose : - (negligible), ±(0.1g/dL), +(0.25g/dL), ++(0.5g/dL), +++(1g/dL)

Ketone body : - (negligible), ±(5mg/dL), +(15mg/dL), ++(40mg/dL), +++(80mg/dL)

Occult blood : - (negligible), ±(trace), +(slight), ++(moderate), +++(marked)

Urobilinogen : Ehrlich unit/dL

Bilirubin : - (negligible), +(slight), ++(moderate), +++(marked)

Table 8 Urinary findings of female rats fed the milk powder-contained diet in a 28day dose range-finding test

Conc. in diet	No. of animals	Color PY	Cloudy		pH						Protein					Glucose					
			-	+	5.0	6.0	6.5	7.0	7.5	8.0	8.5	-	*	+	++	+++	-	*	+	++	+++
0%	6	6	6		2	2	2					4	2				6				
5%	6	6	6		2	2	2					1	5				6				
10%	6	6	6		1	3	2					5	1				6				
20%	6	6	6		2	2	2					5	1				6				

  

Conc. in diet	No. of animals	Ketone body					Occult blood					Urobilinogen				Bilirubin					
		-	*	+	++	+++	-	*	+	++	+++	0.1	1	2	4	8	-	+	++	+++	
0%	6	6					6					6					6				
5%	6	6					3	3				6					6				
10%	6	5	1				6					6					6				
20%	6	5	1				6					6					6				

Color : PY(pale yellow)

Cloudy : - (negligible), + (cloudy)

Protein : - (negligible), ±(15~30mg/dL), +(30mg/dL), ++(100mg/dL), +++(300mg/dL)

Glucose : - (negligible), ±(0.1g/dL), +(0.25g/dL), ++(0.5g/dL), +++(1g/dL)

Ketone body : - (negligible), ±(5mg/dL), +(15mg/dL), ++(40mg/dL), +++(80mg/dL)

Occult blood : - (negligible), ±(trace), +(slight), ++(moderate), +++(marked)

Urobilinogen : Ehrlich unit/dL

Bilirubin : - (negligible), +(slight), ++(moderate), +++(marked)

Table 9  
Hematological findings of male rats fed the milk powder-contained diet  
in a 28day dose range-finding test

Conc. in diet	No. of animals	RBC (10 <sup>6</sup> /μL)	Hb (g/dL)	Ht (%)	MCV (fL)	MCH (pg)	MCHC (%)	WBC (10 <sup>3</sup> /μL)	Plat. (10 <sup>4</sup> /μL)	PT (sec)	APTT (sec)
0%	6	752 ± 17	14.9 ± 0.6	42.4 ± 1.0	56 ± 1	19.8 ± 0.9	35.2 ± 0.9	60 ± 17	106 ± 11	12.9 ± 0.4	20.0 ± 1.5
5%	6	734 ± 31	14.6 ± 0.8	41.6 ± 2.3	57 ± 2	19.9 ± 0.8	35.0 ± 0.9	50 ± 7	121 ± 15	12.7 ± 0.4	19.2 ± 0.8
10%	6	760 ± 37	14.8 ± 0.6	42.2 ± 1.4	56 ± 4	19.5 ± 1.1	35.0 ± 0.7	46 ± 11	122 ± 14	13.0 ± 0.3	18.8 ± 1.2
20%	6	685 ± 136	13.4 ± 3.0	38.8 ± 7.5	57 ± 2	19.4 ± 1.1	34.3 ± 1.9	48 ± 12	122 ± 19	13.0 ± 0.2	19.3 ± 1.7

Each value is expressed as mean±S.D.

Table 10  
Hematological findings of female rats fed the milk powder-contained diet  
in the 28-day repeat dose toxicity test

Conc. in diet	No. of animals	RBC (10 <sup>6</sup> /μL)	Hb (g/dL)	Ht (%)	MCV (fL)	MCH (pg)	MCHC (%)	PT (sec)	APTT (sec)	WBC (10 <sup>3</sup> /μL)
0%	6	768 ± 36	14.8 ± 0.2	41.8 ± 0.8	55 ± 2	19.6 ± 0.9	35.4 ± 0.6	13.0 ± 0.3	18.3 ± 1.1	43 ± 12
5%	6	741 ± 49	14.5 ± 0.7	41.2 ± 2.1	56 ± 2	19.6 ± 0.7	35.3 ± 0.3	13.1 ± 0.4	18.6 ± 0.6	31 ± 9
10%	6	744 ± 39	14.7 ± 0.7	41.5 ± 2.2	56 ± 2	19.8 ± 0.8	35.5 ± 0.4	13.2 ± 0.3	18.6 ± 1.2	26* ± 3
20%	6	742 ± 44	14.8 ± 0.6	41.1 ± 2.1	55 ± 2	20.0 ± 0.7	36.1 ± 0.6	18.0 ± 0.7	17.5 ± 1.0	33 ± 13

  

Conc. in diet	No. of animals	Differential leukocyte counts (%)							Plat. (10 <sup>4</sup> /μL)
		Baso.	Eosin.	Neutro.	Stab.	Seg.	Lymph.	Mono.	
0%	6	0 ± 0	1 ± 1	0 ± 0	12 ± 4	86 ± 6	2 ± 1	0 ± 0	119 ± 16
5%	6	0 ± 0	1 ± 1	0 ± 0	14 ± 3	84 ± 4	1 ± 1	0 ± 0	120 ± 19
10%	6	0 ± 0	1 ± 1	0 ± 0	14 ± 4	84 ± 3	1 ± 1	0 ± 0	122 ± 12
20%	6	0 ± 0	1 ± 1	0 ± 0	11 ± 2	87 ± 4	1 ± 1	0 ± 0	132 ± 19

Each value is expressed as mean±S.D.

\* : Significantly different from control at 5% level of probability

Table 11

Blood biochemical findings of male rats fed the milk powder-contained diet  
in a 28day dose range-finding test

Conc. in diet	No. of animals	LDH (IU/L)	GOT (IU/L)	GPT (IU/L)	ALP (IU/L)	$\gamma$ -GTP (IU/L)	ChE (IU/L)	CK (IU/L)	T.P. (g/dL)	Alb (%)	$\alpha_1$ -G (%)	$\alpha_2$ -G (%)	$\alpha_3$ -G (%)	B-G (%)	$\gamma$ -G (%)	A/G
0%	6	293 ± 77	71 ± 2	27 ± 2	717 ± 180	0.63 ± 0.35	54 ± 5	183 ± 24	6.16 ± 0.32	49.8 ± 1.3	20.7 ± 1.1	6.1 ± 1.1	5.4 ± 0.2	14.7 ± 1.4	3.9 ± 1.0	0.97 ± 0.05
5%	6	269 ± 81	77 ± 7	31 ± 3	663 ± 106	0.42 ± 0.14	55 ± 16	194 ± 46	5.94 ± 0.13	49.9 ± 1.2	22.1 ± 1.3	5.0 ± 0.7	5.5 ± 0.3	13.9 ± 1.1	3.7 ± 1.1	1.00 ± 0.05
10%	6	301 ± 59	80 ± 9	29 ± 5	693 ± 193	0.60 ± 0.20	60 ± 25	210 ± 25	5.87* ± 0.14	50.6 ± 1.4	21.1 ± 1.6	5.2 ± 1.0	5.6 ± 0.9	14.1 ± 1.1	3.4 ± 0.8	1.08 ± 0.06
20%	6	337 ± 137	73 ± 11	27 ± 4	543 ± 172	0.61 ± 0.37	40 ± 6	207 ± 42	6.14 ± 0.12	50.8 ± 2.7	20.7 ± 2.0	5.9 ± 0.8	4.8 ± 1.2	14.0 ± 2.1	3.9 ± 0.9	1.04 ± 0.11

  

Conc. in diet	No. of animals	T-Chol. (mg/dL)	T.G. (mg/dL)	PL (mg/dL)	Glu. (mg/dL)	BUN (mg/dL)	UA (mg/dL)	Crea. (mg/dL)	T-Bil. (mg/dL)	Ca (mg/dL)	P (mg/dL)	Na (mEq/L)	K (mEq/L)	Cl (mEq/L)
0%	6	58 ± 8	71 ± 19	93 ± 12	131 ± 14	12.7 ± 1.4	0.86 ± 0.28	0.53 ± 0.06	0.27 ± 0.04	10.3 ± 0.2	7.2 ± 0.7	144 ± 1	4.47 ± 0.21	107 ± 1
5%	6	55 ± 11	73 ± 31	89 ± 16	127 ± 8	12.8 ± 0.9	0.88 ± 0.16	0.50 ± 0.05	0.80 ± 0.08	10.2 ± 0.1	7.7 ± 0.7	144 ± 1	4.55 ± 0.22	106 ± 1
10%	6	43 ± 11	58 ± 25	78 ± 14	134 ± 19	12.0 ± 0.6	0.86 ± 0.13	0.55 ± 0.04	0.27 ± 0.04	10.1 ± 0.2	7.5 ± 0.5	144 ± 1	4.70 ± 0.20	108 ± 2
20%	6	55 ± 19	78 ± 24	94 ± 20	128 ± 6	10.7* ± 1.7	0.91 ± 0.24	0.52 ± 0.05	0.25 ± 0.02	10.3 ± 0.3	7.6 ± 0.5	145 ± 1	5.06** ± 0.50	108 ± 2

Each value is expressed as mean±S.D.

\* : Significantly different from control at 5% level of probability

\*\* : Significantly different from control at 1% level of probability

Table 12

Blood biochemical findings of female rats fed the milk powder-contained diet  
in a 28day dose range-finding test

Conc. in diet	No. of animals	LDH (IU/L)	GOT (IU/L)	GPT (IU/L)	ALP (IU/L)	$\gamma$ -GTP (IU/L)	ChE (IU/L)	CK (IU/L)	T.P. (g/dL)	Alb (%)	$\alpha_1$ -G (%)	$\alpha_2$ -G (%)	$\alpha_3$ -G (%)	B-G (%)	$\gamma$ -G (%)	A/G
0%	6	320 ± 87	76 ± 8	25 ± 3	441 ± 137	0.39 ± 0.16	316 ± 97	171 ± 24	6.39 ± 0.28	56.2 ± 2.2	19.6 ± 1.4	5.4 ± 0.5	2.1 ± 0.3	12.6 ± 1.8	4.2 ± 0.6	1.28 ± 0.11
5%	6	453 ± 271	82 ± 15	25 ± 4	404 ± 89	0.38 ± 0.20	412 ± 125	198 ± 64	6.38 ± 0.24	56.1 ± 2.9	17.7 ± 2.6	5.8 ± 1.0	8.0 ± 0.6	12.9 ± 0.7	4.6 ± 0.3	1.29 ± 0.15
10%	6	347 ± 57	81 ± 7	23 ± 2	451 ± 62	0.35 ± 0.19	324 ± 146	185 ± 22	6.26 ± 0.38	57.2 ± 1.6	19.6 ± 1.0	4.4 ± 0.7	2.4 ± 0.4	13.0 ± 0.5	3.5 ± 1.0	1.34 ± 0.09
20%	6	430 ± 95	85 ± 14	27 ± 5	388 ± 94	0.32 ± 0.15	378 ± 105	195 ± 24	6.48 ± 0.26	56.6 ± 1.0	18.5 ± 1.2	5.5 ± 0.5	2.6 ± 1.2	12.6 ± 1.1	4.1 ± 0.4	1.31 ± 0.06

  

Conc. in diet	No. of animals	T-Chol. (mg/dL)	T.G. (mg/dL)	PL (mg/dL)	Glu. (mg/dL)	BUN (mg/dL)	UA (mg/dL)	Crea. (mg/dL)	T-Bil. (mg/dL)	Ca (mg/dL)	P (mg/dL)	Na (mEq/L)	K (mEq/L)	Cl (mEq/L)
0%	6	64 ± 6	30 ± 10	111 ± 12	115 ± 9	14.4 ± 2.9	0.86 ± 0.22	0.58 ± 0.06	0.25 ± 0.01	9.9 ± 0.1	6.4 ± 0.4	146 ± 1	4.58 ± 0.24	107 ± 1
5%	6	59 ± 16	27 ± 16	107 ± 26	120 ± 14	13.8 ± 1.4	0.94 ± 0.23	0.60 ± 0.05	0.25 ± 0.03	9.6 ± 0.2	5.7 ± 0.5	146 ± 1	4.36 ± 0.21	108 ± 2
10%	6	52 ± 10	33 ± 9	100 ± 19	123 ± 11	13.5 ± 1.5	0.98 ± 0.25	0.61 ± 0.05	0.27 ± 0.02	9.6 ± 0.2	5.7 ± 0.7	147 ± 1	4.50 ± 0.24	108 ± 2
20%	6	55 ± 7	25 ± 20	99 ± 14	120 ± 17	16.1 ± 2.1	0.97 ± 0.28	0.66 ± 0.07	0.27 ± 0.02	9.8 ± 0.4	6.1 ± 0.8	146 ± 1	4.49 ± 0.23	107 ± 2

Each value is expressed as mean±S.D.

Table 13-1 Absolute and relative organ weights of male rats fed milk powder-contained diet in a 28-day dose range-finding study

	Conc. in diet(%)	No. of Animals	B.W. (g)	Brain (g)	Liver (g)	Kidney (g)	Spleen (g)	Heart (g)	Lung (g)	Thymus (g)	Thyr. (mg)	Pitui. (mg)
Absolute	0	6	312 ±12	1.89 ±0.10	8.72 ±0.69	2.37 ±0.20	0.63 ±0.07	1.09 ±0.06	1.21 ±0.10	0.62 ±0.10	21.0 ±1.9	10.0 ±1.5
	5	6	320 ±20	1.93 ±0.05	8.98 ±0.61	2.49 ±0.15	0.62 ±0.14	1.15 ±0.11	1.25 ±0.13	0.67 ±0.15	21.4 ±4.4	10.6 ±1.2
	10	6	312 ±20	1.94 ±0.06	8.65 ±0.73	2.41 ±0.17	0.58 ±0.03	1.11 ±0.10	1.18 ±0.09	0.53 ±0.06	21.3 ±2.9	10.6 ±0.8
	20	6	300 ±25	1.91 ±0.02	8.88 ±1.27	2.35 ±0.19	0.64 ±0.06	1.06 ±0.06	1.19 ±0.08	0.66 ±0.09	21.7 ±3.4	10.3 ±0.5
Relative <sup>a)</sup>	0	6	312 ±12	0.61 ±0.03	2.79 ±0.17	0.76 ±0.04	0.20 ±0.02	0.35 ±0.02	0.39 ±0.03	0.20 ±0.03	6.7 ±0.7	3.2 ±0.4
	5	6	320 ±20	0.60 ±0.04	2.81 ±0.05	0.78 ±0.06	0.19 ±0.04	0.36 ±0.01	0.39 ±0.05	0.21 ±0.05	6.7 ±1.1	3.3 ±0.4
	10	6	312 ±20	0.62 ±0.06	2.77 ±0.16	0.77 ±0.06	0.18 ±0.01	0.35 ±0.03	0.38 ±0.01	0.17 ±0.01	6.9 ±1.3	3.4 ±0.3
	20	6	300 ±25	0.64 ±0.06	2.96 ±0.33	0.79 ±0.05	0.21 ±0.03	0.35 ±0.02	0.40 ±0.02	0.22 ±0.02	7.2 ±0.9	3.5 ±0.2

Each value is expressed as mean ± S.D.

a) : Relative organ weight per 100g body weight

Table 13-2 Absolute and relative organ weights of male rats fed dry beef-contained diet in a 28-day dose range-finding study

	Dose (mg/kg)	No. of Animals	B.W. (g)	Adrenal (mg)	Testis (g)	Prost. (g)	Semi.v. (g)	Epidid. (g)
Absolute	0	6	312 ±12	53.7 ±5.3	2.70 ±0.24	0.49 ±0.09	1.23 ±0.18	0.77 ±0.06
	5	6	320 ±20	53.1 ±5.6	2.68 ±0.13	0.50 ±0.14	1.22 ±0.12	0.75 ±0.10
	10	6	312 ±20	52.1 ±6.1	2.69 ±0.18	0.50 ±0.05	1.30 ±0.21	0.75 ±0.04
	20	6	300 ±25	53.7 ±8.5	2.61 ±0.27	0.49 ±0.10	1.36 ±0.28	0.71 ±0.05
Relative <sup>a)</sup>	0	6	312 ±12	17.2 ±1.3	0.87 ±0.08	0.16 ±0.03	0.39 ±0.07	0.25 ±0.01
	5	6	320 ±20	16.7 ±2.1	0.84 ±0.04	0.16 ±0.04	0.38 ±0.03	0.23 ±0.02
	10	6	312 ±20	16.7 ±1.8	0.87 ±0.10	0.16 ±0.02	0.42 ±0.09	0.24 ±0.03
	20	6	300 ±25	17.9 ±2.1	0.88 ±0.10	0.17 ±0.04	0.45 ±0.09	0.24 ±0.02

Each value is expressed as mean ± S.D.

a) : Relative organ weight per 100g body weight

Table 14

Absolute and relative organ weights of female rats fed milk powder-contained diet in a 28-day dose range-finding study

	Conc. in diet(%)	No. of Animals	B.W. (g)	Brain (g)	Liver (g)	Kidney (g)	Spleen (g)	Heart (g)	Lung (g)	Thymus (g)	Thyr. (mg)	Pitui. (mg)	Adrenal (mg)	Ovary (mg)	Uterus (g)
Absolute	0	6	211 ± 10	1.85 ± 0.10	5.89 ± 0.25	1.63 ± 0.14	0.42 ± 0.04	0.75 ± 0.06	0.98 ± 0.03	0.52 ± 0.10	21.0 ± 2.4	12.9 ± 1.2	54.9 ± 6.0	78.3 ± 10.7	0.47 ± 0.13
	5	6	217 ± 28	1.83 ± 0.04	6.18 ± 1.17	1.57 ± 0.17	0.45 ± 0.08	0.77 ± 0.10	1.00 ± 0.07	0.49 ± 0.10	20.3 ± 3.8	13.3 ± 2.2	60.0 ± 10.8	74.3 ± 7.7	0.47 ± 0.16
	10	6	211 ± 14	1.82 ± 0.09	5.88 ± 0.60	1.64 ± 0.19	0.42 ± 0.04	0.76 ± 0.07	0.95 ± 0.03	0.46 ± 0.05	20.3 ± 1.9	11.8 ± 1.4	52.4 ± 2.9	86.1 ± 17.0	0.48 ± 0.10
	20	6	216 ± 24	1.81 ± 0.05	6.09 ± 0.62	1.75 ± 0.13	0.42 ± 0.04	0.77 ± 0.08	1.01 ± 0.09	0.52 ± 0.09	21.3 ± 2.6	12.8 ± 1.4	59.0 ± 4.5	79.3 ± 12.6	0.46 ± 0.06
Relative <sup>a)</sup>	0	6	211 ± 10	0.88 ± 0.06	2.79 ± 0.11	0.77 ± 0.05	0.20 ± 0.02	0.35 ± 0.02	0.47 ± 0.02	0.25 ± 0.05	10.0 ± 1.1	6.1 ± 0.6	26.1 ± 3.5	37.2 ± 5.4	0.22 ± 0.06
	5	6	217 ± 28	0.86 ± 0.10	2.84 ± 0.21	0.73 ± 0.06	0.21 ± 0.03	0.36 ± 0.02	0.47 ± 0.06	0.23 ± 0.03	9.5 ± 1.9	6.2 ± 1.0	27.8 ± 5.0	34.7 ± 5.6	0.22 ± 0.08
	10	6	211 ± 14	0.86 ± 0.05	2.79 ± 0.15	0.78 ± 0.05	0.20 ± 0.02	0.36 ± 0.02	0.45 ± 0.01	0.22 ± 0.02	9.7 ± 1.1	5.6 ± 0.6	24.9 ± 1.4	40.8 ± 7.7	0.23 ± 0.04
	20	6	216 ± 24	0.84 ± 0.07	2.82 ± 0.10	0.81 ± 0.05	0.20 ± 0.03	0.36 ± 0.01	0.47 ± 0.02	0.25 ± 0.05	9.9 ± 1.3	6.0 ± 0.5	27.5 ± 3.5	36.8 ± 5.7	0.22 ± 0.04

Each value is expressed as mean ± S.D.

a) : Relative organ weight per 100g body weight

**Appendix 1** Individual body weights of male rats fed the milk powder-contained diet in a 28day dose range-finding test

Conc. in diet	Number of animals	Day	(g)				
			0	7	14	21	28
0%	001	125	191	243	295	337	
	002	120	183	243	290	326	
	003	127	184	235	279	311	
	004	130	193	249	306	345	
	005	124	178	232	284	323	
	006	126	190	231	285	341	
	Mean	125	187	239	290	331	
5%	007	125	193	258	324	376	
	008	119	175	230	277	312	
	009	124	180	237	289	333	
	010	125	186	248	304	350	
	011	129	178	239	296	337	
	012	127	183	232	290	330	
	Mean	125	183	241	297	340	
10%	013	124	182	233	286	328	
	014	126	182	250	307	353	
	015	123	181	235	282	324	
	016	120	171	221	260	299	
	017	127	192	253	309	351	
	018	129	189	243	294	339	
	Mean	125	183	239	290	332	
20%	019	125	186	237	287	331	
	020	123	187	238	288	329	
	021	127	192	255	309	354	
	022	118	166	218	264	299	
	023	124	180	236	289	327	
	024	131	187	245	251	281	
	Mean	125	183	238	281	320	

**Appendix 2** Individual body weights of female rats fed the milk powder-contained diet in a 28day dose range-finding test

Conc. in diet	Number of animals	Day	(g)				
			0	7	14	21	28
0%	501		114	154	179	205	231
	502		116	153	186	210	243
	503		112	144	168	194	216
	504		120	153	178	197	217
	505		110	143	173	195	211
	506		122	154	178	208	228
	Mean		116	150	177	202	224
5%	507		125	184	209	240	281
	508		112	144	169	198	221
	509		111	141	161	180	200
	510		118	151	174	190	208
	511		115	147	172	201	239
	512		116	151	181	208	225
	Mean		116	153	178	203	229
10%	513		110	139	161	188	212
	514		112	144	169	187	215
	515		116	153	185	213	232
	516		119	164	190	220	248
	517		121	156	184	207	232
	518		114	151	175	199	219
	Mean		115	151	177	202	226
20%	519		115	140	160	185	205
	520		110	152	183	205	225
	521		133	167	211	247	278
	522		119	161	189	211	228
	523		114	150	178	203	220
	524		112	148	173	192	216
	Mean		117	153	182	207	229

**Appendix 3** Individual food consumption of male rats fed the milk powder-containind diet in a 28day dose range-finding test

Conc. in diet	Cage number	(g/day/rat)			
		Week 1	2	3	4
0%	1	16	21	20	20
	2	16	19	20	19
	3	16	17	19	21
Mean		16	19	20	20
5%	4	17	20	21	20
	5	16	19	20	20
	6	14	19	20	20
Mean		16	19	20	20
10%	7	15	19	20	20
	8	14	18	18	18
	9	17	20	21	21
Mean		15	19	20	20
20%	10	15	18	19	19
	11	15	18	19	20
	12	15	18	14	19
Mean		15	18	17	19

**Appendix 4** Individual food consumption of female rats fed the milk powder-containind diet in a 28day dose range-finding test

Conc. in diet	Cage number	(g/day/rat)			
		Week 1	2	3	4
0%	13	12	14	16	17
	14	11	14	15	16
	15	11	14	14	14
Mean		11	14	15	16
5%	16	13	15	19	19
	17	11	13	13	13
	18	11	15	14	16
Mean		12	14	15	16
10%	19	10	12	13	13
	20	13	15	15	16
	21	11	13	14	15
Mean		11	13	14	15
20%	22	10	13	14	14
	23	13	16	17	16
	24	11	12	13	14
Mean		11	14	15	15

## Appendix 5

Individual urinary findings of male rats fed the milk powder-contained diet  
in a 28day dose range-finding test

Conc. in diet	Animal number	Color	Cloudy	pH	Protein	Glucose	Ketone body	Occult blood	Urobilinogen	Bilirubin
0%	001	PY	-	6.0	+	-	-	-	0.1	-
	002	PY	-	6.0	+	-	-	-	0.1	-
	003	PY	-	6.0	±	-	-	-	0.1	-
	004	PY	-	6.5	-	-	-	-	0.1	-
	005	PY	-	7.0	±	-	±	-	0.1	-
	008	PY	-	6.5	±	-	±	-	0.1	-
5%	007	PY	-	6.0	±	-	-	-	0.1	-
	008	PY	-	6.5	±	-	±	-	0.1	-
	009	PY	-	6.0	+	-	-	-	0.1	-
	010	PY	-	6.5	+	-	±	-	0.1	-
	011	PY	-	6.0	±	-	-	-	0.1	-
	012	PY	-	6.0	-	-	-	-	0.1	-
10%	013	PY	-	6.5	±	-	-	-	0.1	-
	014	PY	-	6.5	±	-	-	-	0.1	-
	015	PY	-	6.0	±	-	±	-	0.1	-
	016	PY	-	6.5	±	-	-	-	0.1	-
	017	PY	-	6.5	-	-	±	-	0.1	-
	018	PY	-	6.5	-	-	±	-	0.1	-
20%	019	PY	-	6.0	±	-	-	-	0.1	-
	020	PY	-	6.5	±	-	±	-	0.1	-
	021	PY	-	6.0	±	-	-	-	0.1	-
	022	PY	-	6.0	-	-	-	-	0.1	-
	023	PY	-	6.0	●	-	●	-	0.1	-
	024	PY	-	6.5	±	-	-	-	0.1	-

Color : PY(pale yellow)

Cloudy : - (negligible)

Protein : - (negligible), ±(15~30mg/dL), + (30mg/dL)

Glucose : - (negligible)

Ketone body : - (negligible), ±(5mg/dL)

Occult blood : - (negligible)

Urobilinogen : Ehrlich unit/dL

Bilirubin : - (negligible)

## Appendix 6

Individual urinary findings of female rats fed the milk powder-contained diet  
in a 28day dose range-finding test

Conc. in diet	Animal number	Color	Cloudy	pH	Protein	Glucose	Ketone body	Occult blood	Urobilinogen	Bilirubin
0%	501	PY	-	7.0	-	-	-	-	0.1	-
	502	PY	-	6.5	●	-	-	-	0.1	-
	503	PY	-	6.0	-	-	-	-	0.1	-
	504	PY	-	7.0	-	-	-	-	0.1	-
	505	PY	-	6.5	-	-	-	-	0.1	-
	506	PY	-	6.0	±	-	-	-	0.1	-
5%	507	PY	-	6.5	±	-	-	-	0.1	-
	508	PY	-	6.0	-	-	-	±	0.1	-
	509	PY	-	6.5	±	-	-	±	0.1	-
	510	PY	-	7.0	±	-	-	±	0.1	-
	511	PY	-	6.0	±	-	-	-	0.1	-
	512	PY	-	7.0	±	-	-	-	0.1	-
10%	513	PY	-	6.0	-	-	-	-	0.1	-
	514	PY	-	7.0	-	-	-	-	0.1	-
	515	PY	-	7.0	-	-	-	-	0.1	-
	516	PY	-	6.5	±	-	-	±	0.1	-
	517	PY	-	6.5	-	-	-	-	0.1	-
	518	PY	-	6.6	-	-	-	-	0.1	-
20%	519	PY	-	7.0	-	-	-	-	0.1	-
	520	PY	-	7.0	-	-	-	-	0.1	-
	521	PY	-	6.6	-	-	-	-	0.1	-
	522	PY	-	6.6	-	-	-	-	0.1	-
	523	PY	-	6.0	●	-	-	-	0.1	-
	524	PY	-	6.0	-	-	●	-	0.1	-

Color : PY(pale yellow)

Cloudy : - (negligible)

Protein : - (negligible), ±(15~30mg/dL)

Glucose : - (negligible)

Ketone body : - (negligible), ±(5mg/dL)

Occult blood : - (negligible), ±(trace)

Urobilinogen : Ehrlich unit/dL

Bilirubin : - (negligible)

## Appendix 7

Individual hematological findings of male rats fed the milk powder-contained diet  
in a 28day dose range-finding test

Conc. in diet	Animal number	RBC ( $10^6/\mu\text{L}$ )	Hb (g/dL)	Ht (%)	MCV (fL)	MCH (pg)	MCHC (%)	WBC ( $10^3/\mu\text{L}$ )	Plat. ( $10^3/\mu\text{L}$ )	PT (sec)	APTT (sec)
0%	001	770	14.8	42.2	56	19.2	35.1	67	110	13.2	20.1
	002	764	15.5	43.7	57	20.3	35.5	61	95	12.9	22.4
	003	735	14.7	41.2	56	20.0	35.7	49	94	13.4	20.6
	004	754	14.2	41.4	55	18.8	34.3	56	124	12.3	18.2
	005	728	15.4	42.2	58	21.2	36.5	39	110	12.6	19.9
	006	762	14.8	43.5	57	19.4	34.0	90	102	12.8	18.6
	Mean	752	14.9	42.4	56	19.8	35.2	60	106	12.9	20.0
5%	007	714	13.8	39.7	56	19.3	34.8	59	145	12.5	19.1
	008	718	14.9	41.0	57	20.8	36.3	50	105	12.5	20.3
	009	739	14.2	42.1	57	19.2	33.7	61	120	12.6	18.6
	010	701	13.7	38.5	55	19.5	35.6	49	120	12.4	20.1
	011	739	15.5	44.4	60	21.0	34.9	38	124	13.4	18.2
	012	790	15.3	43.8	55	19.4	34.9	48	110	12.9	19.0
	Mean	734	14.6	41.6	57	19.9	35.0	50	121	12.7	19.2
10%	013	716	14.2	40.3	56	19.8	35.2	52	115	12.8	20.3
	014	781	15.5	42.9	55	19.8	36.1	52	118	12.7	19.1
	015	743	15.4	43.8	59	20.7	35.2	60	120	13.5	18.7
	016	822	14.2	40.6	49	17.3	35.0	28	150	12.9	18.6
	017	753	14.8	42.6	57	19.7	34.7	46	118	13.0	16.8
	018	747	14.7	43.2	58	19.7	34.0	39	110	12.8	19.5
	Mean	760	14.8	42.2	56	19.5	35.0	46	122	13.0	18.8
20%	019	749	14.7	41.3	56	19.6	35.6	62	129	12.8	20.7
	020	719	14.8	42.3	59	20.6	35.0	45	115	13.0	21.2
	021	718	14.6	42.0	58	20.3	34.8	30	129	13.1	18.4
	022	780	14.8	42.0	54	19.0	35.2	40	132	12.7	18.3
	023	734	14.4	41.6	57	19.6	34.6	57	142	13.2	20.3
	024	411	7.2	23.6	57	17.5	30.5	61	87	13.1	16.8
	Mean	685	13.4	38.8	57	19.4	34.3	48	122	13.0	19.3

**Appendix 8 · 1** Individual hematological findings of female rats fed the milk powder-contained diet in a 28day dose range finding test

Conc. in diet	Animal number	RBC ( $10^6/\mu\text{L}$ )	Hb (g/dL)	Ht (%)	MCV (fL)	MCH (pg)	MCHC (%)	PT (sec)	APTT (sec)	WBC ( $10^3/\mu\text{L}$ )
0%	501	769	14.9	41.8	54	19.4	36.6	13.3	18.3	64
	502	714	14.9	41.1	58	20.9	36.3	13.0	18.8	34
	503	797	14.7	42.3	53	18.4	34.8	12.5	19.8	39
	504	735	14.8	41.3	56	20.1	35.8	13.0	16.5	30
	505	800	15.0	43.2	54	18.8	34.7	13.2	18.3	47
	506	731	14.5	41.1	56	19.8	35.3	12.9	18.0	42
	Mean	758	14.8	41.8	55	19.6	35.4	13.0	18.3	43
5%	507	667	13.6	38.5	58	20.4	35.3	12.6	17.6	42
	508	806	15.4	43.8	54	19.1	35.2	12.8	19.3	39
	509	761	14.1	39.8	52	18.5	35.4	13.3	18.9	17
	510	748	16.1	42.2	56	20.2	35.8	12.6	18.0	30
	511	704	14.0	39.9	57	19.9	35.1	13.5	18.5	26
	512	762	15.0	42.8	56	19.7	35.0	13.5	19.0	31
	Mean	741	14.5	41.2	56	19.6	35.3	13.1	18.6	31
10%	513	795	14.9	42.3	53	18.7	35.2	12.6	18.8	27
	514	785	15.3	44.0	56	19.5	34.8	13.2	20.2	28
	515	718	14.1	39.6	56	19.8	35.6	13.5	18.4	22
	516	744	15.8	44.1	59	21.2	35.8	13.4	17.4	22
	517	699	13.9	39.2	56	19.9	35.5	13.0	17.1	27
	518	730	14.3	39.9	55	19.6	35.8	13.2	19.6	27
	Mean	744	14.7	41.5	56	19.8	35.5	13.2	18.6	26
20%	519	766	16.3	43.3	57	20.2	35.3	13.4	18.3	27
	520	687	14.4	38.7	56	21.0	37.2	12.9	18.7	37
	521	725	14.5	40.5	56	20.0	35.8	14.1	17.4	25
	522	806	15.1	42.1	52	18.7	35.9	12.6	16.4	22
	523	708	14.1	38.8	55	19.9	36.3	12.8	18.0	30
	524	772	15.6	43.1	56	20.2	36.2	11.9	16.4	67
	Mean	742	14.8	41.1	55	20.0	36.1	13.0	17.5	33

**Appendix 8 · 2** Individual hematological findings of female rats fed the milk powder-contained diet in the 28-day repeat dose toxicity test

Conc. in diet	Animal number	Differential leukocyte counts (%)							Plat. ( $10^3/\mu\text{L}$ )
		Baso.	Eosin.	Neutro.	Seg.	Lymph.	Mono.	Other	
0%	501	0	1	0	14	82	3	0	102
	502	0	0	0	9	89	2	0	95
	503	0	0	1	6	93	0	0	131
	504	0	0	0	14	86	0	0	129
	505	0	0	0	10	87	3	0	131
	506	0	3	0	18	76	3	0	127
	Mean	0	1	0	12	86	2	0	119
5%	507	0	0	0	12	86	2	0	90
	508	0	1	1	16	81	1	0	139
	509	0	3	0	18	78	1	0	120
	510	0	2	0	10	88	0	0	106
	511	0	1	0	14	83	2	0	127
	512	0	1	0	11	87	1	0	138
	Mean	0	1	0	14	84	1	0	120
10%	513	0	0	0	18	80	2	0	130
	514	0	1	0	10	89	0	0	128
	515	0	2	0	9	86	3	0	99
	516	0	2	0	13	84	1	0	122
	517	0	0	0	19	81	0	0	124
	518	0	2	0	12	85	1	0	131
	Mean	0	1	0	14	84	1	0	122
20%	519	0	0	0	10	90	0	0	120
	520	0	1	0	9	90	0	0	119
	521	0	2	0	15	80	3	0	147
	522	0	2	0	9	88	1	0	158
	523	0	0	0	10	90	0	0	108
	524	0	1	0	12	86	1	0	138
	Mean	0	1	0	11	87	1	0	132

## Appendix 9-1

Individual blood biochemical findings of male rats fed the milk powder-contained diet in a 28day dose range-finding test

Conc. in diet	Animal number	LDH (IU/L)	GOT (IU/L)	GPT (IU/L)	ALP (IU/L)	γ-GTP (IU/L)	ChE (IU/L)	CK (IU/L)	T.P. (g/dL)	Alb (%)	α <sub>1</sub> -G (%)	α <sub>2</sub> -G (%)	β-G (%)	γ-G (%)	A/G	
0%	001	314	70	27	701	0.88	52	216	6.04	47.4	20.4	6.0	5.0	16.9	4.3	0.90
	002	437	71	26	821	0.14	46	208	6.45	50.3	20.9	7.3	5.4	14.0	2.1	1.01
	003	221	69	24	936	0.59	54	174	5.91	50.3	18.9	7.3	5.5	13.8	4.7	1.01
	004	276	71	26	830	0.77	55	162	6.11	48.2	20.6	6.2	5.7	16.9	3.4	0.93
	005	241	73	30	482	0.35	53	160	5.80	49.0	22.2	6.0	5.3	14.3	4.2	0.96
	006	271	69	26	530	1.07	61	176	6.68	50.6	20.9	4.6	5.3	13.9	4.8	1.02
	Mean	293	71	27	717	0.63	54	183	6.16	49.3	20.7	6.1	5.4	14.7	3.9	0.97
5%	007	402	88	33	773	0.61	40	276	6.04	50.7	22.9	4.0	5.3	12.6	4.6	1.03
	008	197	78	32	610	0.44	51	175	6.04	51.2	21.6	5.0	5.1	13.0	4.1	1.05
	009	315	69	30	748	0.34	56	218	5.92	48.2	20.5	5.7	5.7	15.8	4.6	0.98
	010	280	84	34	606	0.64	81	181	6.04	50.2	24.3	4.3	5.8	13.7	1.7	1.01
	011	209	71	29	504	0.29	36	168	5.84	50.3	21.2	5.4	5.3	14.9	2.9	1.01
	012	208	73	25	734	0.27	64	157	5.73	48.5	22.0	5.7	5.9	13.8	4.1	0.94
	Mean	269	77	31	663	0.42	55	194	5.94	49.9	22.1	6.0	5.5	18.9	3.7	1.00
10%	013	330	84	33	622	0.64	39	220	5.80	51.4	21.6	4.5	5.1	13.3	4.2	1.06
	014	331	88	29	834	0.25	95	214	5.90	52.2	22.5	3.8	4.7	13.2	3.6	1.09
	015	309	80	32	953	0.64	86	247	5.83	50.8	21.9	4.8	5.9	13.0	3.6	1.08
	016	291	87	34	803	0.72	51	189	6.10	48.4	21.7	5.4	6.2	14.5	3.8	0.94
	017	355	73	25	510	0.83	38	213	5.90	49.5	18.0	6.3	6.9	16.0	3.3	0.98
	018	190	65	22	537	0.51	50	177	5.67	51.5	21.0	6.3	4.7	14.5	2.0	1.06
	Mean	301	80	29	698	0.60	60	210	5.87	50.6	21.1	5.2	5.6	14.1	3.4	1.03
20%	019	477	78	31	475	0.48	49	242	6.04	49.9	21.9	6.8	4.5	13.0	3.9	1.00
	020	323	71	28	747	0.39	42	188	5.98	50.1	19.4	6.5	5.1	14.8	4.1	1.00
	021	177	65	25	686	0.45	35	153	6.14	54.0	21.1	5.4	3.8	12.7	3.0	1.17
	022	321	72	32	453	0.67	32	220	6.26	52.6	23.1	4.6	3.7	11.6	4.4	1.11
	023	211	59	22	613	0.33	40	176	6.29	46.3	17.5	6.3	7.0	17.7	5.2	0.86
	024	515	90	26	288	1.32	40	264	6.12	52.0	21.0	5.7	4.4	14.1	2.8	1.08
	Mean	337	73	27	543	0.61	40	207	6.14	50.8	20.7	5.9	4.8	14.0	3.9	1.04

## Appendix 9-2

Individual blood biochemical findings of male rats fed the milk powder-contained diet in a 28day dose range-finding test

Conc. in diet	Animal number	T-Chol. (mg/dL)	T.G. (mg/dL)	PL (mg/dL)	Glu. (mg/dL)	BUN (mg/dL)	UA (mg/dL)	Crea. (mg/dL)	T-Bil. (mg/dL)	Ca (mg/dL)	P (mg/dL)	Na (mEq/L)	K (mEq/L)	Cl (mEq/L)
0%	001	68	74	112	146	13.3	1.20	0.55	0.29	10.2	5.8	144	4.31	106
	002	52	76	92	146	14.4	1.16	0.64	0.22	10.5	7.3	145	4.26	106
	003	55	88	93	118	11.9	0.87	0.55	0.26	10.2	7.3	144	4.28	107
	004	51	63	81	132	13.8	0.68	0.52	0.22	10.2	7.8	145	4.61	108
	005	53	36	79	113	10.3	0.55	0.46	0.29	10.1	7.5	144	4.59	107
	006	66	86	98	132	12.9	0.64	0.48	0.32	10.6	7.7	144	4.74	106
	Mean	58	71	98	131	12.7	0.85	0.53	0.27	10.3	7.2	144	4.47	107
5%	007	66	126	109	122	12.0	1.05	0.54	0.31	10.2	7.0	143	4.62	106
	008	46	71	81	119	13.3	0.76	0.54	0.33	10.2	7.0	144	4.37	106
	009	66	86	106	122	11.4	0.93	0.54	0.27	10.0	7.2	143	4.71	106
	010	53	72	89	132	12.7	0.98	0.48	0.26	10.2	8.3	142	4.84	106
	011	40	38	66	127	14.0	0.68	0.42	0.31	10.3	7.9	146	4.24	107
	012	58	48	91	141	13.2	0.68	0.46	0.33	10.3	8.6	144	4.54	107
	Mean	55	73	89	127	12.8	0.83	0.50	0.30	10.2	7.7	144	4.55	106
10%	013	62	68	97	106	12.2	0.86	0.56	0.29	10.1	7.3	145	4.61	110
	014	52	98	90	137	11.8	0.78	0.61	0.24	10.2	6.9	144	4.48	107
	015	39	76	84	125	11.5	1.05	0.55	0.30	10.1	7.3	143	4.69	107
	016	35	31	66	158	12.3	0.79	0.60	0.21	9.7	7.5	144	5.01	110
	017	32	43	63	152	12.8	0.98	0.55	0.30	10.2	8.2	143	4.87	106
	018	39	44	68	123	11.3	0.69	0.50	0.27	10.2	8.0	144	4.55	108
	Mean	43	58	78	134	12.0	0.86	0.55	0.27	10.1	7.5	144	4.70	108
20%	019	47	71	83	131	12.7	0.92	0.61	0.22	10.4	8.0	145	5.22	106
	020	30	40	60	130	10.1	0.80	0.47	0.24	10.1	7.0	143	5.19	108
	021	61	66	100	130	10.8	0.79	0.47	0.29	10.4	7.9	145	4.72	105
	022	59	104	110	125	12.6	0.74	0.58	0.25	10.3	7.5	145	4.75	108
	023	48	96	93	135	8.6	0.80	0.50	0.24	10.7	6.9	145	4.55	108
	024	87	91	115	118	9.1	1.39	0.52	0.28	9.9	8.2	145	5.93	111
	Mean	55	78	94	128	10.7	0.91	0.52	0.25	10.3	7.6	145	5.06	108

## Appendix 10 · 1

Individual blood biochemical findings of female rats fed the milk powder-contained diet in a 28day dose range-finding test

Conc. in diet	Animal number	LDH (IU/L)	GOT (IU/L)	GPT (IU/L)	ALP (IU/L)	γ-GTP (IU/L)	CHE (IU/L)	CK (IU/L)	T.P. (g/dL)	Alb (%)	α <sub>1</sub> -G (%)	α <sub>2</sub> -G (%)	α <sub>3</sub> -G (%)	B-G (%)	γ-G (%)	A/G
0%	501	343	83	25	480	0.31	390	166	6.66	56.4	19.8	4.8	2.2	12.6	4.2	1.29
	502	300	66	21	330	0.68	199	156	6.44	67.5	18.9	5.6	2.2	11.6	4.3	1.36
	503	479	84	27	467	0.34	370	196	6.32	56.7	17.7	5.9	2.2	12.8	4.7	1.31
	504	239	81	26	648	0.43	189	158	6.37	52.9	19.1	5.4	1.9	16.0	4.7	1.12
	505	303	73	27	468	0.33	337	205	5.90	54.4	21.9	5.9	2.3	11.5	4.0	1.19
	506	253	67	21	252	0.24	410	147	6.64	69.1	20.2	5.0	1.6	10.9	3.2	1.44
	Mean	320	76	26	441	0.39	316	171	6.39	66.2	19.6	5.4	2.1	12.6	4.2	1.28
5%	507	293	68	26	412	0.38	642	146	6.57	57.2	17.9	4.7	3.0	12.4	4.8	1.34
	508	567	85	31	432	0.27	443	209	6.41	57.8	17.4	5.9	2.6	12.3	4.5	1.34
	509	236	79	22	396	0.53	400	117	6.70	51.7	20.4	7.3	3.9	12.3	4.4	1.07
	510	312	72	20	562	0.20	297	184	6.38	53.1	19.9	6.0	2.7	13.5	4.8	1.13
	511	365	75	23	329	0.20	370	241	6.15	58.8	13.0	5.9	3.5	13.9	4.9	1.43
	512	966	110	29	300	0.71	318	293	6.06	58.3	17.3	4.8	2.3	13.1	4.2	1.40
	Mean	453	82	25	404	0.38	412	198	6.38	56.1	17.7	5.8	3.0	12.9	4.6	1.29
10%	513	402	75	24	368	0.01	234	200	6.23	68.9	18.2	4.0	2.5	13.7	2.7	1.43
	514	252	71	21	467	0.35	161	154	6.02	55.2	19.9	4.8	2.8	12.5	4.8	1.23
	515	381	81	24	468	0.31	420	198	6.18	56.1	20.9	3.7	2.8	13.2	3.3	1.28
	516	392	87	25	392	0.41	217	201	5.75	57.6	19.5	3.7	2.1	13.4	3.7	1.36
	517	320	89	22	539	0.51	368	159	6.64	59.0	18.8	5.5	1.9	12.7	2.1	1.44
	518	334	81	24	471	0.51	545	195	6.84	66.4	20.1	4.4	2.1	12.7	4.3	1.29
	Mean	347	81	23	451	0.35	324	185	6.26	57.2	19.6	4.4	2.4	13.0	3.5	1.34
20%	519	370	99	27	404	0.36	369	198	6.27	55.6	18.8	5.7	4.1	11.6	4.2	1.25
	520	334	73	24	245	0.37	352	153	6.94	56.8	19.0	5.6	1.8	12.3	4.5	1.31
	521	412	99	35	357	0.46	206	187	6.23	57.2	17.3	4.7	2.0	14.6	4.2	1.34
	522	608	96	27	534	0.08	425	220	6.35	58.2	19.2	5.9	1.3	11.9	3.5	1.39
	523	423	67	20	371	0.19	526	218	6.68	55.9	20.0	5.1	2.2	12.8	4.0	1.27
	524	432	78	26	416	0.45	392	192	6.51	55.9	16.8	6.2	4.2	12.5	4.4	1.27
	Mean	430	85	27	388	0.32	378	195	6.48	56.6	18.5	5.5	2.6	12.6	4.1	1.31

## Appendix 10 · 2

Individual blood biochemical findings of female rats fed the milk powder-contained diet in a 28day dose range-finding test

Conc. in diet	Animal number	T-Chol. (mg/dL)	T.G. (mg/dL)	PL (mg/dL)	Gl. (mg/dL)	BUN (mg/dL)	UA (mg/dL)	Crea. (mg/dL)	T-Bil. (mg/dL)	Ca (mg/dL)	P (mg/dL)	Na (mEq/L)	K (mEq/L)	Cl (mEq/L)
0%	501	65	29	115	125	19.6	0.98	0.68	0.24	9.8	5.9	147	4.29	107
	502	65	38	118	124	16.2	0.96	0.58	0.27	10.1	6.2	146	4.27	107
	503	72	22	125	110	14.4	1.17	0.60	0.26	9.7	6.3	145	4.62	108
	504	60	16	106	101	11.6	0.57	0.53	0.24	9.8	6.9	145	4.79	108
	505	56	44	89	111	13.8	0.80	0.53	0.25	9.9	6.9	145	4.78	105
	506	67	28	114	120	11.9	0.68	0.55	0.24	9.8	6.0	147	4.40	108
	Mean	64	30	111	115	14.4	0.86	0.58	0.25	9.9	6.4	146	4.53	107
5%	507	83	33	144	145	15.3	0.83	0.62	0.23	9.8	5.5	145	4.01	106
	508	74	56	130	120	14.3	1.19	0.63	0.27	9.8	5.5	146	4.31	107
	509	53	15	100	112	12.8	0.56	0.57	0.23	9.7	5.6	146	4.38	108
	510	54	20	103	121	15.4	0.94	0.63	0.30	9.7	5.0	147	4.41	111
	511	43	25	80	111	13.0	1.02	0.63	0.21	9.4	5.9	145	4.68	107
	512	49	11	83	108	12.0	1.10	0.51	0.26	9.3	6.6	146	4.38	109
	Mean	59	27	107	120	13.8	0.94	0.60	0.25	9.6	5.7	146	4.36	108
10%	513	61	42	113	135	14.3	1.21	0.66	0.29	9.8	5.1	147	4.44	106
	514	37	25	78	119	13.8	1.27	0.61	0.27	9.5	5.6	148	4.40	110
	515	56	35	108	124	14.6	0.87	0.59	0.28	9.6	6.3	146	4.86	107
	516	47	33	82	114	10.9	0.97	0.62	0.28	9.2	4.9	147	4.23	111
	517	64	40	128	137	12.6	0.59	0.65	0.24	9.7	6.6	146	4.71	108
	518	49	20	93	109	14.7	0.94	0.61	0.28	9.7	5.9	148	4.34	107
	Mean	52	33	100	123	13.5	0.98	0.61	0.27	9.6	5.7	147	4.50	108
20%	519	51	21	87	104	15.1	1.16	0.67	0.27	9.3	5.5	148	4.81	109
	520	54	19	101	107	18.3	0.89	0.78	0.28	9.8	5.6	146	4.24	106
	521	52	12	85	134	18.5	1.08	0.68	0.28	9.4	5.7	145	4.58	106
	522	48	16	90	112	12.8	1.22	0.61	0.27	9.9	5.6	148	4.64	109
	523	57	66	117	115	16.0	0.60	0.62	0.25	10.4	7.1	146	4.41	105
	524	67	17	116	147	16.0	0.86	0.68	0.24	9.9	7.1	145	4.25	107
	Mean	55	25	99	120	16.1	0.97	0.66	0.27	9.8	6.1	146	4.49	107

Appendix 11 Absolute organ weights of individual male rats fed milk powder-contained diet in a 28-day dose range-finding study

Conc. in diet(%)	Animal numbers	B.W. (g)	Brain (g)	Liver (g)	Kidney (g)	Spleen (g)	Heart (g)	Lung (g)	Thymus (g)	Thyr. (mg)	Pitui. (mg)	Adrenal (mg)	Testis (g)	Prost. (g)	Semi.v (g)	Epidid. (g)
0	001	317	1.89	9.13	2.37	0.70	1.13	1.29	0.61	23.3	9.6	62.4	2.46	0.62	1.02	0.76
	002	306	1.85	9.36	2.27	0.56	1.02	1.20	0.73	19.5	8.8	50.0	2.61	0.51	1.47	0.76
	003	295	1.85	7.88	2.15	0.67	1.10	1.09	0.45	20.8	8.7	47.2	2.68	0.55	1.28	0.71
	004	325	1.81	9.11	2.43	0.69	1.14	1.31	0.68	19.6	12.7	54.4	2.56	0.45	1.15	0.79
	005	306	1.88	7.79	2.26	0.55	1.02	1.28	0.66	23.4	9.4	52.3	2.72	0.44	1.39	0.71
	006	323	2.08	9.02	2.73	0.58	1.15	1.09	0.56	19.1	10.7	56.0	3.16	0.36	1.08	0.88
	Mean	312	1.89	8.72	2.37	0.63	1.09	1.21	0.62	21.0	10.0	53.7	2.70	0.49	1.23	0.77
5	007	356	1.96	10.03	2.44	0.75	1.33	1.26	0.72	29.5	10.9	50.3	2.87	0.73	1.31	0.88
	008	296	1.97	8.30	2.41	0.66	1.03	1.17	0.90	21.1	9.9	53.4	2.56	0.34	1.14	0.64
	009	315	1.84	9.08	2.27	0.54	1.10	1.14	0.49	17.9	8.6	51.7	2.53	0.44	1.09	0.79
	010	327	1.94	9.14	2.70	0.80	1.20	1.21	0.74	17.8	11.9	61.0	2.64	0.58	1.40	0.76
	011	315	1.96	8.57	2.54	0.52	1.11	1.50	0.66	19.2	11.6	44.9	2.71	0.50	1.24	0.79
	012	311	1.90	8.73	2.59	0.45	1.10	1.22	0.53	23.0	10.8	57.4	2.78	0.40	1.12	0.62
	Mean	320	1.93	8.98	2.49	0.62	1.15	1.25	0.67	21.4	10.6	53.1	2.68	0.50	1.22	0.75
10	013	312	1.93	8.02	2.35	0.56	1.04	1.19	0.55	23.9	10.2	44.6	2.77	0.55	1.27	0.70
	014	331	1.87	9.18	2.32	0.57	1.19	1.19	0.56	17.4	9.7	60.7	2.38	0.43	1.11	0.71
	015	303	1.88	7.97	2.23	0.56	1.19	1.15	0.54	21.6	10.2	57.7	2.85	0.56	1.60	0.80
	016	279	2.01	8.23	2.36	0.54	0.99	1.04	0.40	25.2	10.4	47.9	2.78	0.45	1.44	0.79
	017	330	1.92	9.81	2.72	0.63	1.21	1.31	0.57	20.5	11.5	49.4	2.76	0.53	1.35	0.72
	018	319	2.00	8.69	2.50	0.61	1.03	1.18	0.55	19.3	11.6	52.0	2.57	0.50	1.05	0.76
	Mean	312	1.94	8.65	2.41	0.58	1.11	1.18	0.53	21.3	10.6	52.1	2.69	0.50	1.30	0.75
20	019	308	1.94	8.28	2.28	0.62	1.13	1.30	0.72	25.5	10.0	65.2	2.12	0.49	1.14	0.68
	020	309	1.88	8.50	2.38	0.69	1.08	1.21	0.71	22.6	10.7	54.3	2.65	0.37	1.89	0.75
	021	334	1.91	9.66	2.71	0.57	1.11	1.22	0.72	20.6	11.1	56.3	2.97	0.51	1.31	0.68
	022	278	1.91	8.33	2.17	0.56	1.02	1.05	0.51	19.8	10.3	41.2	2.64	0.60	1.43	0.76
	023	307	1.88	11.04	2.26	0.68	1.00	1.19	0.70	25.3	10.2	58.1	2.67	0.60	1.23	0.74
	024	265	1.93	7.48	2.31	0.71	0.99	1.14	0.61	16.6	9.7	46.8	2.63	0.37	1.16	0.64
	Mean	300	1.91	8.88	2.35	0.64	1.06	1.19	0.66	21.7	10.3	53.7	2.61	0.49	1.36	0.71

Appendix 12 Relative organ weights of individual male rats fed milk powder-contained diet in a 28-day dose range-finding study

Conc. in diet(%)	Animal numbers	B.W. (g)	Brain (%)	Liver (%)	Kidney (%)	Spleen (%)	Heart (%)	Lung (%)	Thymus (%)	Thyr. (mg%)	Pitui. (mg%)	Adrenal (mg%)	Testis (%)	Prost. (%)	Semi.v (%)	Epidid. (%)
0	001	317	0.60	2.88	0.75	0.22	0.36	0.41	0.19	7.4	3.0	19.7	0.78	0.20	0.32	0.24
	002	306	0.60	3.06	0.74	0.18	0.33	0.39	0.24	6.4	2.9	16.3	0.85	0.17	0.48	0.25
	003	295	0.63	2.67	0.73	0.23	0.37	0.37	0.15	7.1	2.9	16.0	0.91	0.19	0.43	0.24
	004	325	0.56	2.80	0.75	0.21	0.35	0.40	0.21	6.0	3.9	16.7	0.79	0.14	0.35	0.24
	005	306	0.61	2.55	0.74	0.18	0.33	0.42	0.22	7.6	3.1	17.1	0.89	0.14	0.45	0.23
	006	323	0.64	2.79	0.85	0.18	0.36	0.34	0.17	5.9	3.3	17.3	0.98	0.11	0.33	0.27
	Mean	312	0.61	2.79	0.76	0.20	0.35	0.39	0.20	6.7	3.2	17.2	0.87	0.16	0.39	0.25
5	007	356	0.55	2.82	0.69	0.21	0.37	0.35	0.20	8.3	3.1	14.1	0.81	0.21	0.37	0.25
	008	296	0.67	2.80	0.81	0.22	0.35	0.40	0.30	7.1	3.3	18.0	0.86	0.11	0.39	0.22
	009	315	0.58	2.88	0.72	0.17	0.35	0.36	0.16	5.7	2.7	16.4	0.80	0.14	0.35	0.25
	010	327	0.59	2.80	0.83	0.24	0.37	0.37	0.23	5.4	3.6	18.7	0.81	0.18	0.43	0.23
	011	315	0.62	2.72	0.81	0.17	0.35	0.48	0.21	6.1	3.7	14.3	0.86	0.16	0.39	0.25
	012	311	0.61	2.81	0.83	0.14	0.35	0.39	0.17	7.4	3.5	18.5	0.89	0.13	0.36	0.20
	Mean	320	0.60	2.81	0.78	0.19	0.36	0.39	0.21	6.7	3.3	16.7	0.84	0.16	0.38	0.23
10	013	312	0.62	2.57	0.75	0.18	0.33	0.38	0.18	7.7	3.3	14.3	0.89	0.18	0.41	0.22
	014	331	0.56	2.77	0.70	0.17	0.36	0.36	0.17	5.3	2.9	18.3	0.72	0.13	0.34	0.21
	015	303	0.62	2.63	0.74	0.18	0.39	0.38	0.18	7.1	3.4	19.0	0.94	0.18	0.53	0.26
	016	279	0.72	2.95	0.85	0.19	0.35	0.37	0.14	9.0	3.7	17.2	1.00	0.16	0.52	0.28
	017	330	0.58	2.97	0.82	0.19	0.37	0.40	0.17	6.2	3.5	15.0	0.84	0.16	0.41	0.22
	018	319	0.63	2.72	0.78	0.19	0.32	0.37	0.17	6.1	3.6	16.3	0.81	0.16	0.33	0.24
	Mean	312	0.62	2.77	0.77	0.18	0.35	0.38	0.17	6.9	3.4	16.7	0.87	0.16	0.42	0.24
20	019	308	0.63	2.69	0.74	0.20	0.37	0.42	0.23	8.3	3.2	21.2	0.69	0.16	0.37	0.22
	020	309	0.61	2.75	0.77	0.22	0.35	0.39	0.23	7.3	3.5	17.6	0.86	0.12	0.61	0.24
	021	334	0.57	2.89	0.81	0.17	0.33	0.37	0.22	6.2	3.3	16.9	0.89	0.15	0.39	0.26
	022	278	0.69	3.00	0.78	0.20	0.37	0.38	0.18	7.1	3.7	14.8	0.95	0.22	0.51	0.27
	023	307	0.61	3.60	0.74	0.22	0.33	0.39	0.23	8.2	3.3	18.9	0.87	0.20	0.40	0.24
	024	265	0.73	2.82	0.87	0.27	0.37	0.43	0.23	6.3	3.7	17.7	0.99	0.14	0.44	0.24
	Mean	300	0.64	2.96	0.79	0.21	0.35	0.40	0.22	7.2	3.5	17.9	0.88	0.17	0.45	0.24

Appendix 13 Absolute organ weights of individual female rats fed milk powder-contained diet in a 28-day dose range-finding study

Conc. in diet(%)	Animal numbers	B.W. (g)	Brain (g)	Liver (g)	Kidney (g)	Spleen (g)	Heart (g)	Lung (g)	Thymus (g)	Thyr. (mg)	Pitui. (mg)	Adrenal (mg)	Ovary (mg)	Uterus (g)
0	501	218	1.92	5.91	1.61	0.46	0.76	0.96	0.46	25.7	14.4	50.2	76.3	0.53
	502	226	1.88	6.23	1.88	0.42	0.85	1.03	0.67	19.1	12.9	59.9	89.1	0.44
	503	201	2.01	6.05	1.64	0.45	0.75	0.97	0.49	19.4	13.4	60.1	91.8	0.47
	504	209	1.78	5.76	1.64	0.35	0.70	0.98	0.42	20.1	13.4	51.9	63.8	0.38
	505	199	1.74	5.50	1.52	0.44	0.69	0.95	0.61	21.5	12.2	60.4	78.0	0.31
	506	212	1.77	5.86	1.47	0.40	0.73	0.99	0.46	20.4	10.8	46.6	70.6	0.69
	Mean	211	1.85	5.89	1.63	0.42	0.75	0.98	0.52	21.0	12.9	54.9	78.3	0.47
5	507	265	1.82	8.51	1.88	0.58	0.95	1.09	0.55	19.2	17.1	71.7	77.9	0.63
	508	211	1.87	5.96	1.47	0.49	0.79	1.02	0.57	17.8	12.2	64.3	80.9	0.46
	509	186	1.79	5.39	1.47	0.37	0.67	1.02	0.33	17.3	13.8	63.3	70.6	0.66
	510	196	1.87	5.53	1.57	0.43	0.67	1.04	0.44	23.2	13.9	44.0	80.1	0.40
	511	227	1.83	6.05	1.42	0.37	0.75	0.90	0.58	26.7	11.0	49.3	60.5	0.24
	512	215	1.78	5.63	1.59	0.43	0.81	0.92	0.48	17.8	11.7	67.2	75.5	0.42
	Mean	217	1.83	6.18	1.57	0.45	0.77	1.00	0.49	20.3	13.3	60.0	74.3	0.47
10	513	193	1.70	5.26	1.41	0.44	0.70	0.91	0.51	22.4	9.9	52.2	60.8	0.53
	514	201	1.79	5.49	1.56	0.39	0.67	0.93	0.39	17.8	11.1	47.9	106.9	0.37
	515	218	1.93	5.86	1.80	0.46	0.79	0.97	0.47	22.5	11.2	50.7	76.2	0.43
	516	232	1.77	6.54	1.91	0.39	0.88	1.01	0.50	20.5	12.4	55.7	97.1	0.65
	517	217	1.92	6.69	1.52	0.48	0.75	0.95	0.49	19.6	14.1	55.1	96.6	0.45
	518	204	1.79	5.44	1.64	0.37	0.79	0.94	0.42	19.1	12.2	52.7	79.1	0.47
	Mean	211	1.82	5.88	1.64	0.42	0.76	0.95	0.46	20.3	11.8	52.4	86.1	0.48
20	519	198	1.76	5.64	1.64	0.44	0.69	0.99	0.63	20.9	10.9	65.6	64.2	0.56
	520	214	1.83	6.22	1.81	0.37	0.76	1.00	0.58	20.6	13.9	53.3	101.5	0.40
	521	263	1.89	7.29	1.93	0.43	0.91	1.18	0.55	23.4	14.6	61.7	84.4	0.40
	522	211	1.74	5.69	1.64	0.37	0.73	1.00	0.52	24.8	11.9	58.9	74.9	0.46
	523	211	1.81	5.78	1.85	0.42	0.77	1.00	0.38	17.1	12.6	55.0	74.2	0.48
	524	201	1.80	5.92	1.62	0.48	0.73	0.89	0.48	20.9	13.2	59.7	76.6	0.45
	Mean	216	1.81	6.09	1.75	0.42	0.77	1.01	0.52	21.3	12.8	59.0	79.3	0.46

Appendix 14 Relative organ weights of individual female rats fed milk powder-contained diet in a 28-day dose range-finding study

Conc. in diet(%)	Animal numbers	B.W. (g)	Brain (%)	Liver (%)	Kidney (%)	Spleen (%)	Heart (%)	Lung (%)	Thymus (%)	Thyr. (mg%)	Pitui. (mg%)	Adrenal (mg%)	Ovary (mg%)	Uterus (%)
0	501	218	0.88	2.71	0.74	0.21	0.35	0.44	0.21	11.8	6.6	23.0	35.0	0.24
	502	226	0.83	2.76	0.83	0.19	0.38	0.46	0.30	8.5	5.7	26.5	39.4	0.19
	503	201	1.00	3.01	0.82	0.22	0.37	0.48	0.24	9.7	6.7	29.9	45.7	0.23
	504	209	0.85	2.76	0.78	0.17	0.33	0.47	0.20	9.6	6.4	24.8	30.5	0.18
	505	199	0.87	2.76	0.76	0.22	0.35	0.48	0.31	10.8	6.1	30.4	39.2	0.16
	506	212	0.83	2.76	0.69	0.19	0.34	0.47	0.22	9.6	5.1	22.0	33.3	0.33
	Mean	211	0.88	2.79	0.77	0.20	0.35	0.47	0.25	10.0	6.1	26.1	37.2	0.22
5	507	265	0.69	3.21	0.71	0.22	0.36	0.41	0.21	7.2	6.5	27.1	29.4	0.24
	508	211	0.89	2.82	0.70	0.23	0.37	0.48	0.27	8.4	5.8	30.5	38.3	0.22
	509	186	0.96	2.90	0.79	0.20	0.36	0.55	0.18	9.3	7.4	34.0	38.0	0.35
	510	196	0.95	2.82	0.80	0.22	0.34	0.53	0.22	11.8	7.1	22.4	40.9	0.20
	511	227	0.81	2.67	0.63	0.16	0.33	0.40	0.26	11.8	4.8	21.7	26.7	0.11
	512	215	0.83	2.62	0.74	0.20	0.38	0.43	0.22	8.3	5.4	31.3	35.1	0.20
	Mean	217	0.86	2.84	0.73	0.21	0.36	0.47	0.23	9.5	6.2	27.8	34.7	0.22
10	513	193	0.88	2.73	0.73	0.23	0.36	0.47	0.26	11.6	5.1	27.0	31.5	0.27
	514	201	0.89	2.73	0.78	0.19	0.33	0.46	0.19	8.9	5.5	23.8	53.2	0.18
	515	218	0.89	2.69	0.83	0.21	0.36	0.44	0.22	10.3	5.1	23.3	35.0	0.20
	516	232	0.76	2.82	0.82	0.17	0.38	0.44	0.22	8.8	5.3	24.0	41.9	0.28
	517	217	0.88	3.08	0.70	0.22	0.35	0.44	0.23	9.0	6.5	25.4	44.5	0.21
	518	204	0.88	2.67	0.80	0.18	0.39	0.46	0.21	9.4	6.0	25.8	38.8	0.23
	Mean	211	0.86	2.79	0.78	0.20	0.36	0.45	0.22	9.7	5.6	24.9	40.8	0.23
20	519	198	0.89	2.85	0.83	0.22	0.35	0.50	0.32	10.6	5.4	33.1	32.4	0.28
	520	214	0.86	2.91	0.85	0.17	0.36	0.47	0.27	9.6	6.5	24.9	47.4	0.19
	521	263	0.72	2.77	0.73	0.16	0.35	0.45	0.21	8.9	5.6	23.5	32.1	0.15
	522	211	0.82	2.70	0.78	0.18	0.35	0.47	0.25	11.8	5.6	27.9	35.5	0.22
	523	211	0.86	2.74	0.88	0.20	0.36	0.47	0.18	8.1	6.0	26.1	35.2	0.23
	524	201	0.90	2.95	0.81	0.24	0.36	0.44	0.24	10.4	6.6	29.7	38.1	0.22
	Mean	216	0.84	2.82	0.81	0.20	0.36	0.47	0.25	9.9	6.0	27.5	36.8	0.22

Table 1 Analyzed nutrient composition of the dried beef

Macronutrient (%)		Vitamin (mg/100g)		Mineral (mg/100g)
Crude protein	42.8	A ND	C a 17.1	
Crude fat	50.0	B <sub>1</sub> 0.23	P 386	
Carbohydrate	4.3	B <sub>2</sub> 0.50	K 1120	
Crude fiber	0.0	B <sub>6</sub> 0.54	N a 767	
Ash	2.0	B <sub>12</sub> 0.0031	M g 47.3	
Water	0.9	D <sub>3</sub> ND	F e 6.26	
		E 0.2	Z n 9.99	
		K <sub>1</sub> ND	C u 0.14	
		K <sub>2</sub> 0.010	S 370	
		Niacin 12.1	M n 0.03	
		Pantothenic acid 2.55	I ND	
		Folic acid 0.019	S e 0.03	
		Biotin 0.0042	M o ND	
		Choline 0.13 (%)		

Table 2-1 Composition of the dried beef-contained diets

Ingredient	Basal diet I	5% diet	10% diet	Basal diet II	20% diet	(g/kg diets)
Dried beef		50.000	100.000		200.000	
Cornstarch	397.486	396.019	394.552	374.965	369.097	
Casein (93.5% protein)	200.000	177.112	154.225	200.000	108.449	
Alfa-cornstarch	132.000	131.513	131.027	124.521	122.573	
Sucrose	100.000	100.000	100.000	100.000	100.000	
Soybean oil	70.000	45.000	20.000	100.000		
Cellulose	50.000	50.000	50.000	50.000	50.000	
Mineral Mix *	35.000	35.000	35.000	35.000	35.000	
Vitamin Mix *	10.000	10.000	10.000	10.000	10.000	
L-Cystine	3.000	3.000	3.000	3.000	3.000	
Choline Bitartrate (41.1% choline)	2.500	2.342	2.184	2.500	1.867	
t-Butylhydroquinone	0.014	0.014	0.014	0.014	0.014	
Caloric value (kcal)	397	398	399	411	415	
Crude protein (%)	18.7	18.7	18.7	18.7	18.7	
Crude fat (%)	7.0	7.0	7.0	10.0	10.0	
Carbohydrate (%)	64.7	65.0	65.2	61.5	62.5	
Crude fiber (%)	5.0	5.0	5.0	5.0	5.0	

\* : Ingredients of the mineral mix and vitamin mix are shown in table 2-2.

Table 2-2 Ingredients of the mineral mix and vitamin mix for the dried beef-contained diet

Mineral Mix							Vitamin Mix					(g/kg Mix)
Ingredients	Contents (%)	Basal diet I	5% diet	10% diet	Basal diet II	20% diet	Ingredients	Basal diet I/II	5% diet	10% diet	20% diet	
<b>ESSENTIAL MINERALS</b>												
Calcium Carbonate	Ca : 40.04	357.00	356.357	355.786	357.00	354.572	Vitamine A Palmitate (500,000IU/g)	0.800	0.800	0.800	0.800	
Potassium Phosphate (monobasic)	P : 22.76	196.00	192.359	188.843	196.00	181.688	Thiamine HCl (B <sub>1</sub> )	0.600	0.590	0.580	0.550	
Potassium Citrate H <sub>2</sub> O	K : 28.73						Riboflavin (B <sub>2</sub> )	0.600	0.580	0.550	0.500	
K : 38.18	57.29*	51.812	45.832	122.844*			Pyridoxine HCl (B <sub>6</sub> )	0.700	0.670	0.650	0.590	
Sodium Chloride	Na : 39.34	74.00	45.584	17.242	114.00*		Vitamine B <sub>12</sub> (0.1%)	2.500	2.300	2.200	1.900	
Potassium Sulfate	S : 18.39	57.47*	28.735		115.00*		Vitamine D <sub>3</sub> (400,000IU/g)	0.250	0.250	0.250	0.250	
K : 44.87	Mg : 60.32	24.00	22.871	21.788	24.00	19.529	Vitamine B Acetate (500IU/g)	15.000	15.000	15.000	15.000	
Magnesium Oxide	Fe : 16.50	6.08	5.541	5.021	6.08	3.809	Vitamine K <sub>1</sub>	0.075	0.075	0.074	0.073	
Ferric Citrate	Zn : 52.14	1.65	1.375	1.100	1.65	0.550	Niacin	3.000	3.000	3.000	3.000	
Zinc Carbonate	Mn : 47.79	0.63	0.630	0.630	0.63	0.620	Calcium Pantothenate	1.600	1.500	1.300	1.100	
Manganese Carbonate	Cu : 57.47	0.30	0.295	0.295	0.30	0.285	Folic Acid	0.200	0.200	0.200	0.200	
Cupric Carbonate	I : 59.30	0.01	0.01	0.01	0.01	0.01	Biotin	0.020	0.020	0.019	0.018	
Potassium Iodate	Se : 41.79	0.01025	0.00957	0.00880	0.01025	0.00615	Sucrose finely powdered	974.655	975.015	975.376	976.018	
Sodium Selenate	Mo : 54.34	0.00795	0.00795	0.00795	0.00795	0.00795						
Ammonium Paramolybdate 4H <sub>2</sub> O												
NON-ESSENTIAL MINERALS												
Sodium Metasilicate 9H <sub>2</sub> O	Si : 9.88	1.45	1.45	1.45	1.45	1.45						
Chromium Potassium Sulfate 12H <sub>2</sub> O	Cr : 10.42	0.275	0.275	0.275	0.275	0.275						
Lithium Chloride	Li : 16.38	0.0174	0.0174	0.0174	0.0174	0.0174						
Boric Acid	B : 17.50	0.0815	0.0815	0.0815	0.0815	0.0815						
Sodium Fluoride	F : 45.24	0.0635	0.0635	0.0635	0.0635	0.0635						
Nickel Carbonate	Ni : 45.00	0.0318	0.0318	0.0318	0.0318	0.0318						
Ammonium Vanadate	V : 43.55	0.0066	0.0066	0.0066	0.0066	0.0066						
Sucrose finely powdered		223.846	292.688	381.511	180.562	436.999						

\* : Composition is differ from that of the AIN standard diet.  
The mineral mix and vitamin mix for each composition was designed to reflect the mineral (essential minerals) and vitamin contents of the dried beef at each additional level.

Table 3 Body weights of male rats fed the dry beef-contained diet in a 28day dose range-finding test

Conc. in diet	Number of animals	Day	(g)					Gain 0~28
			1	7	14	21	28	
0% <sup>a)</sup>	6		121 ± 4	176 ± 6	236 ± 8	291 ± 7	335 ± 11	214 ± 14
5%	6		122 ± 6	181 ± 8	239 ± 14	296 ± 24	340 ± 31	218 ± 28
10%	6		121 ± 6	172 ± 7	226 ± 12	280 ± 20	308 ± 23	188 ± 20
0% <sup>b)</sup>	6		122 ± 5	180 ± 8	240 ± 12	286 ± 23	319 ± 40	198 ± 37
20%	6		121 ± 5	164 * ± 12	208 * ± 22	246 * ± 30	271 * ± 34	150 * ± 30

Each value is expressed as mean±S.D.

a):Control I      b):Control II

\*:Significantly different from control II at 5% level of probability

Table 4 Body weights of female rats fed the dry beef-contained diet in a 28day dose range-finding test

Conc. in diet	Number of animals	Day	(g)					Gain 0~28
			1	7	14	21	28	
0% <sup>a)</sup>	6		116 ± 5	146 ± 6	174 ± 10	198 ± 12	218 ± 16	102 ± 16
5%	6		115 ± 7	149 ± 15	171 ± 15	201 ± 15	223 ± 17	107 ± 11
10%	6		115 ± 5	145 ± 7	175 ± 9	195 ± 14	210 ± 18	94 ± 15
0% <sup>b)</sup>	6		116 ± 7	148 ± 11	180 ± 12	207 ± 13	231 ± 18	115 ± 13
20%	6		116 ± 6	145 ± 11	174 ± 17	197 ± 17	217 ± 20	101 ± 18

Each value is expressed as mean±S.D.

a):Control I      b):Control II

Table

Table 5 Food consumption of male rats fed the dry beef-contained diet in a 28day dose range-finding test

Conc. in diet	Number of animals	(g/day/rat)				Conc. diet
		Week 1	2	3	4	
0% <sup>a)</sup>	6	18 ± 1	21 ± 1	22 ± 2	22 ± 1	0%
5%	6	18 ± 2	19 ± 2	21 ± 3	21 ± 3	5%
10%	6	17 ± 1	19 ± 1	20 ± 2	18 ± 1	10%
0% <sup>b)</sup>	6	17 ± 1	19 ± 2	20 ± 2	17 ± 0	0%
20%	6	16 ± 1	18 ± 3	17 ± 3	15 ± 5	20%

Each value is expressed as mean±S.D.

a):Control I      b):Control II

Color  
Cloud  
Protei  
Glucos  
Ketone  
Occult  
Urobil  
Bilirub  
a) : Co

Table

Table 6 Food consumption of female rats fed the dry beef-contained diet in a 28day dose range-finding test

Conc. in diet	Number of animals	(g/day/rat)				Conc. diet
		Week 1	2	3	4	
0% <sup>a)</sup>	6	13 ± 1	14 ± 2	15 ± 1	15 ± 2	0%
5%	6	13 ± 2	13 ± 3	15 ± 1	15 ± 1	5%
10%	6	14 ± 1	14 ± 2	14 ± 3	13 ± 1	10%
0% <sup>b)</sup>	6	14 ± 1	14 ± 1	15 ± 0	15 ± 2	0%
20%	6	13 ± 1	14 ± 1	13 ± 1	14 ± 1	20%

Each value is expressed as mean±S.D.

a):Control I      b):Control II

Color  
Cloud  
Protei  
Glucos  
Ketone  
Occult  
Urobil  
Bilirub  
a) : Co

Table 7 Urinary findings of male rats fed the dry beef-contained diet in a 28day dose range-finding test

Conc. in diet	No. of animals	Color PY	Cloudy		pH						Protein					Glucose					
			-	+	5.0	6.0	6.5	7.0	7.5	8.0	8.5	-	±	+	++	+++	-	±	+	++	+++
0% <sup>a)</sup>	6	6		6				5	1			2	4					6			
5%	6	6		6				6				3	3					6			
10%	6	6		6				4	1	1		1	4	1				6			
0% <sup>b)</sup>	6	6		6				6				1	4	1				6			
20%	6	6		6				5	1			3	2	1				6			

  

Conc. in diet	No. of animals	Ketone body					Occult blood					Urobilinogen					Bilirubin				
		-	±	+	++	+++	-	±	+	++	+++	0.1	1	2	4	8	-	+	++	+++	
0% <sup>a)</sup>	6	4	2				6					6					6				
5%	6	5	1				6					6					6				
10%	6	5	1				4	2				6					6				
0% <sup>b)</sup>	6	6					6					6					6				
20%	6	6					5	1				6					6				

Color : PY(pale yellow)

Cloudy : -(negligible), +(cloudy)

Protein : -(negligible), ±(15~30mg/dL), +(30mg/dL), ++(100mg/dL), +++(300mg/dL)

Glucose : -(negligible), ±(0.1g/dL), +(0.25g/dL), ++(0.5g/dL), +++(1g/dL)

Ketone body : -(negligible), ±(5mg/dL), +(15mg/dL), ++(40mg/dL), +++(80mg/dL)

Occult blood : -(negligible), ±(trace), +(slight), ++(moderate), +++(marked)

Urobilinogen : Ehrlich unit/dL

Bilirubin : -(negligible), +(slight), ++(moderate), +++(marked)

a) : Control I , b) : Control II

Table 8 Urinary findings of female rats fed the dry beef-contained diet in a 28day dose range-finding test

Conc. in diet	No. of animals	Color PY	Cloudy		pH						Protein					Glucose					
			-	+	5.0	6.0	6.5	7.0	7.5	8.0	8.5	-	±	+	++	+++	-	±	+	++	+++
0% <sup>a)</sup>	6	6		6				5	1			2	4				6				
5%	6	6		6				3	2	1		5	1				6				
10%	6	6		6				3	2	1		3	2	1			6				
0% <sup>b)</sup>	6	6		6				4	1	1		2	4				6				
20%	6	6		6				4	1	1		4	2				6				

  

Conc. in diet	No. of animals	Ketone body					Occult blood					Urobilinogen					Bilirubin				
		-	±	+	++	+++	-	±	+	++	+++	0.1	1	2	4	8	-	+	++	+++	
0% <sup>a)</sup>	6	6					6					6					6				
5%	6	6					3	2	1			6					6				
10%	6	6					6					6					6				
0% <sup>b)</sup>	6	6					5	1				6					6				
20%	6	6					6					6					6				

Color : PY(pale yellow)

Cloudy : -(negligible), +(cloudy)

Protein : -(negligible), ±(15~30mg/dL), +(30mg/dL), ++(100mg/dL), +++(300mg/dL)

Glucose : -(negligible), ±(0.1g/dL), +(0.25g/dL), ++(0.5g/dL), +++(1g/dL)

Ketone body : -(negligible), ±(5mg/dL), +(15mg/dL), ++(40mg/dL), +++(80mg/dL)

Occult blood : -(negligible), ±(trace), +(slight), ++(moderate), +++(marked)

Urobilinogen : Ehrlich unit/dL

Bilirubin : -(negligible), +(slight), ++(moderate), +++(marked)

a) : Control I , b) : Control II

Table 9 Hematological findings of male rats fed the dry beef-contained diet in the 28-day repeat dose toxicity test

Conc. in diet	No. of animals	RBC (10 <sup>6</sup> /μL)	Hb (g/dL)	Ht (%)	MCV (fL)	MCH (pg)	MCHC (%)	PT (sec)	APTT (sec)	WBC (10 <sup>6</sup> /μL)
0% <sup>a)</sup>	6	737 ± 24	14.0 ± 0.7	40.7 ± 1.9	55 ± 4	19.0 ± 1.2	34.4 ± 0.7	12.8 ± 0.3	19.4 ± 1.7	60 ± 7
5%	6	773 ± 20	14.6 ± 0.5	42.5 ± 1.1	55 ± 2	18.8 ± 0.7	34.2 ± 0.6	13.3 ± 0.4	18.8 ± 1.1	62 ± 22
10%	6	731 ± 65	14.2 ± 1.3	40.9 ± 3.4	56 ± 2	19.4 ± 0.8	34.6 ± 1.2	13.6 ± 0.8	19.1 ± 1.4	46 ± 5
20%	6	756 ± 48	14.6 ± 0.9	42.8 ± 2.5	57 ± 4	19.3 ± 1.6	34.0 ± 0.4	13.4 ± 1.0	19.7 ± 2.9	51 ± 17
0% <sup>b)</sup>	6	822 ± 64	14.3 ± 2.1	41.4 ± 4.5	51 # ± 4	17.3 ± 2.0	34.4 ± 1.7	13.6 ± 0.3	18.2 ± 1.1	38 ± 10
Differential leukocyte counts (%)										
Conc. in diet	No. of animals	Baso.	Eosin.	Neutro.	Seg.	Lymph.	Mono.	Other	Plat. (10 <sup>6</sup> /μL)	
0% <sup>a)</sup>	6	0 ± 0	1 ± 1	0 ± 0	14 ± 5	83 ± 6	2 ± 1	0 ± 0	132 ± 9	0% <sup>a)</sup>
5%	6	0 ± 0	1 ± 1	0 ± 0	14 ± 4	84 ± 4	1 ± 1	0 ± 0	119 ± 16	5% <sup>a)</sup>
10%	6	0 ± 0	1 ± 2	0 ± 0	12 ± 4	86 ± 5	2 ± 1	0 ± 0	143 ± 47	10% <sup>a)</sup>
20%	6	0 ± 0	0 ± 1	0 ± 0	15 ± 4	83 ± 5	1 ± 1	0 ± 0	124 ± 18	20% <sup>a)</sup>
0% <sup>b)</sup>	6	0 ± 0	1 ± 1	0 ± 0	12 ± 3	86 ± 4	1 ± 1	0 ± 0	134 ± 50	0% <sup>b)</sup>

Each value is expressed as mean±S.D.

a) : Control I , b) : Control II

# : Significantly different from control II at 5% level of probability

Table 11

Conc. in diet	0% <sup>a)</sup>	5%	10%	20%	Conc. in diet	0% <sup>a)</sup>	5%	10%	20%	Each val: a) : Cont *: Signi **: Signi #: Sign
---------------	------------------	----	-----	-----	---------------	------------------	----	-----	-----	--

Table 10 Hematological findings of female rats fed the dry beef-contained diet in a 28day dose range-finding test

Conc. in diet	No. of animals	RBC (10 <sup>6</sup> /μL)	Hb (g/dL)	Ht (%)	MCV (fL)	MCH (pg)	MCHC (%)	WBC (10 <sup>6</sup> /μL)	Plat. (10 <sup>6</sup> /μL)	PT (sec)	APTT (sec)
0% <sup>a)</sup>	6	762 ± 28	15.0 ± 0.3	42.0 ± 1.2	56 ± 2	19.7 ± 0.6	35.8 ± 0.6	37 ± 6	104 ± 7	12.8 ± 0.3	18.1 ± 1.4
5%	6	767 ± 21	14.8 ± 0.4	42.2 ± 0.6	55 ± 2	19.4 ± 0.7	35.2 ± 0.7	46 ± 30	120 ± 13	12.9 ± 0.3	17.7 ± 1.4
10%	6	787 ± 38	15.3 ± 0.4	43.1 ± 0.8	55 ± 2	19.5 ± 0.8	35.5 ± 0.7	29 ± 6	126 ** ± 10	13.0 ± 0.4	18.0 ± 0.5
20%	6	748 ± 23	15.3 ± 0.4	43.0 ± 0.9	58 ± 1	20.4 ± 0.5	35.6 ± 0.7	34 ± 9	114 ± 15	13.2 ± 0.6	18.1 ± 1.6
0% <sup>b)</sup>	6	765 ± 28	14.2 ± 1.2	40.8# ± 2.2	53## ± 2	18.6## ± 1.2	34.9 ± 1.6	33 ± 10	124 ± 17	12.9 ± 0.3	18.3 ± 0.5

Each value is expressed as mean±S.D.

a) : Control I , b) : Control II

\* : Significantly different from control I at 5% level of probability

\*\* : Significantly different from control I at 1% level of probability

# : Significantly different from control II at 5% level of probability

## : Significantly different from control II at 1% level of probability

Table 11 Blood biochemical findings of male rats fed the dry beef-contained diet in a 28day dose range-finding test

Conc. in diet	No. of animals	LDH (IU/L)	GOT (IU/L)	GPT (IU/L)	ALP (IU/L)	$\gamma$ -GTP (IU/L)	ChE (IU/L)	CK (IU/L)	T.P. (g/dL)	Alb (%)	$\alpha_1$ -G (%)	$\alpha_2$ -G (%)	$\alpha_3$ -G (%)	B-G (%)	$\gamma$ -G (%)	A/G
0% <sup>a)</sup>	6	323 ± 119 ± 8	82 ± 3	30 ± 164 ± 0.26	666 ± 10	0.56 ± 0.22	50 ± 34	223 ± 2.1	5.84 ± 0.22	50.7 ± 1.6	22.8 ± 0.9	5.5 ± 0.5	2.9 ± 1.0	14.3 ± 0.9	3.9 ± 0.9	1.03 ± 0.09
5%	6	238 ± 84 ± 8	75 ± 2	28 ± 135 ± 0.12	736 ± 5	0.47 ± 0.32	49 ± 87	220 ± 1.6	5.88 ± 0.9	52.6 ± 1.0	21.9 ± 0.5	6.0 ± 1.0	2.8 ± 0.5	13.5 ± 1.0	3.2 ± 0.7	1.11 ± 0.07
10%	6	344 ± 98 ± 12	74 ± 3	32 ± 164 ± 0.11	799 ± 7	0.20** ± 0.19	41 ± 42	288 ± 6.0	5.83 ± 2.9	52.2 ± 2.9	23.2 ± 1.3	5.2 ± 0.7	2.7 ± 3.8	13.4 ± 1.4	3.3 ± 1.4	1.12 ± 0.26
0% <sup>b)</sup>	6	403 ± 57 ± 6	82 ± 3	28 ± 305 ± 0.25	710 ± 10	0.41 ± 0.12	51 ± 43	249 ± 1.7	5.89 ± 5.6	50.3 ± 1.2	24.0 ± 0.8	4.9 ± 1.2	3.4 ± 0.8	12.9 ± 3.0	4.5 ± 0.5	1.01 ± 0.07
20%	6	339 ± 170 ± 18	96 ± 5	32 ± 187 ± 0.42	1086 ± 4	0.55 ± 0.14	41 ± 69	228 ± 2.6	5.66# ± 2.1	51.5 ± 2.1	21.0 ± 1.2	5.6 ± 1.1	3.7 ± 1.1	13.9 ± 1.4	4.3 ± 1.0	1.07 ± 0.11
Conc. in diet	No. of animals	T-Chol. (mg/dL)	T.G. (mg/dL)	PL (mg/dL)	Glu. (mg/dL)	BUN (mg/dL)	UA (mg/dL)	Crea. (mg/dL)	T-Bil. (mg/dL)	Ca (mg/dL)	P (mg/dL)	Na (mEq/L)	K (mEq/L)	Cl (mEq/L)		
0% <sup>a)</sup>	6	52 ± 12 ± 28	55 ± 18	84 ± 11 ± 2.0	115 ± 0.21	12.8 ± 0.06	0.96 ± 0.02	0.49 ± 0.3	0.28 ± 0.5	9.9 ± 1.0	7.6 ± 0.5	144 ± 1	4.22 ± 0.19	106 ± 1		
5%	6	47 ± 14 ± 18	60 ± 15	85 ± 15 ± 2.5	136* ± 0.31	10.6 ± 0.07	1.07 ± 0.04	0.53 ± 0.5	0.25 ± 0.7	9.9 ± 0.7	8.3 ± 0.7	144 ± 1	4.53 ± 0.39	105 ± 1		
10%	6	42 ± 4 ± 17	41 ± 8	76 ± 10 ± 2.3	126 ± 0.15	11.3 ± 0.09	1.26 ± 0.08	0.53 ± 0.1	0.27 ± 0.4	9.6 ± 0.4	8.1 ± 0.4	145 ± 1	4.65 ± 0.67	107 ± 1		
0% <sup>b)</sup>	6	43 ± 8 ± 14	34 ± 12	71 ± 6 ± 2.1	120 ± 0.10	11.1 ± 0.03	0.94 ± 0.03	0.47 ± 0.03	0.28 ± 0.4	9.7 ± 0.6	8.2 ± 0.6	146 ± 1	4.59 ± 0.36	106 ± 2		
20%	6	39 ± 6 ± 10	31 ± 7	75 ± 15 ± 1.6	129 ± 0.30	12.8 ± 0.07	1.37 ± 0.03	0.52 ± 0.3	0.28 ± 0.3	9.4 ± 0.6	7.3 ± 0.6	144 ± 1	4.25 ± 0.65	104 ± 3		

Each value is expressed as mean±S.D.

a) : Control I, b) : Control II

\* : Significantly different from control I at 5% level of probability

\*\* : Significantly different from control I at 1% level of probability

# : Significantly different from control II at 5% level of probability

Table 12 Blood biochemical findings of female rats fed the dry beef-contained diet in a 28day dose range-finding test

Conc. in diet	No. of animals	LDH (IU/L)	GOT (IU/L)	GPT (IU/L)	ALP (IU/L)	$\gamma$ -GTP (IU/L)	ChE (IU/L)	CK (IU/L)	T.P. (g/dL)	Alb (%)	$\alpha_1$ -G (%)	$\alpha_2$ -G (%)	$\alpha_3$ -G (%)	B-G (%)	$\gamma$ -G (%)	A/G
0% <sup>a)</sup>	6	378 ± 106 ± 5	84 ± 5	26 ± 6	415 ± 66	0.49 ± 0.19	257 ± 86	221 ± 73	6.33 ± 0.32	57.4 ± 1.3	18.6 ± 1.9	5.9 ± 0.8	2.7 ± 0.3	12.6 ± 0.7	3.1 ± 0.4	1.35 ± 0.07
5%	6	474 ± 115 ± 11	78 ± 11	25 ± 2	416 ± 70	0.44 ± 0.25	319 ± 104	205 ± 46	6.34 ± 0.44	56.5 ± 2.2	19.1 ± 1.7	5.9 ± 0.4	2.5 ± 0.6	12.3 ± 0.9	3.7 ± 0.3	1.30 ± 0.12
10%	6	551 ± 134 ± 11	87 ± 11	24 ± 2	498 ± 153	0.54 ± 0.32	349 ± 79	219 ± 34	6.19 ± 0.25	58.0 ± 2.5	17.8 ± 2.3	4.1* ± 1.3	2.8 ± 1.0	13.1 ± 0.9	4.2** ± 0.6	1.39 ± 0.14
0% <sup>b)</sup>	6	609 ± 200 ± 6	81 ± 2	26 ± 42	413 ± 42	0.44 ± 0.21	253 ± 72	196 ± 32	6.40 ± 0.39	59.7 ± 2.0	18.6 ± 0.6	4.0 ± 0.7	2.1 ± 0.7	12.3 ± 1.0	3.3 ± 1.3	1.49 ± 0.12
20%	6	495 ± 229 ± 4	78 ± 2	26 ± 55	462 ± 67	0.23# ± 0.08	371# ± 87	228 ± 88	6.37 ± 0.42	56.8 ± 2.9	18.8 ± 1.3	5.8## ± 1.0	2.3 ± 0.7	12.8 ± 0.8	8.6 ± 1.6	1.32 ± 0.15
Conc. in diet	No. of animals	T-Chol. (mg/dL)	T.G. (mg/dL)	PL (mg/dL)	Glu. (mg/dL)	BUN (mg/dL)	UA (mg/dL)	Crea. (mg/dL)	T-Bil. (mg/dL)	Ca (mg/dL)	P (mg/dL)	Na (mEq/L)	K (mEq/L)	Cl (mEq/L)		
0% <sup>a)</sup>	6	54 ± 12 ± 6	20 ± 15	99 ± 12	117 ± 2.7	16.5 ± 0.22	0.89 ± 0.09	0.64 ± 0.03	0.25 ± 0.4	9.7 ± 0.9	6.7 ± 0.9	143 ± 1	4.11 ± 0.32	106 ± 2		
5%	6	51 ± 9 ± 12	20 ± 16	93 ± 11	122 ± 3.6	14.7 ± 0.29	1.20 ± 0.10	0.63 ± 0.03	0.27 ± 0.2	9.8 ± 1.0	6.8 ± 1.0	144 ± 1	4.14 ± 0.37	107 ± 1		
10%	6	52 ± 12 ± 5	13 ± 16	95 ± 7	107 ± 3.0	15.1 ± 0.11	1.13 ± 0.07	0.66 ± 0.03	0.27 ± 0.2	9.6 ± 0.6	6.6 ± 0.6	145 ± 1	4.28 ± 0.22	110*		
0% <sup>b)</sup>	6	51 ± 8 ± 4	14 ± 10	91 ± 15	122 ± 2.2	14.2 ± 0.16	0.92 ± 0.05	0.60 ± 0.03	0.26 ± 0.3	9.8 ± 0.7	6.4 ± 1.0	145 ± 1	4.27 ± 0.27	108 ± 2		
20%	6	45 ± 8 ± 13	20 ± 16	90 ± 6	127 ± 5.2	17.8 ± 0.29	1.18 ± 0.06	0.68# ± 0.02	0.27 ± 0.3	9.8 ± 0.6	6.7 ± 0.6	145 ± 2	4.46 ± 0.87	108 ± 2		

Each value is expressed as mean±S.D.

a) : Control I, b) : Control II

\* : Significantly different from control I at 5% level of probability

\*\* : Significantly different from control I at 1% level of probability

# : Significantly different from control II at 5% level of probability

## : Significantly different from control II at 1% level of probability

Table 13-1 Absolute and relative organ weights of male rats fed dry beef-contained diet in a 28-day dose range-finding study

Conc. in diet(%)	No. of Animals	B.W. (g)	Brain (g)	Liver (g)	Kidney (g)	Spleen (g)	Heart (g)	Lung (g)	Thymus (g)	Thyr. (mg)	Pitui. (mg)
Absolute	0 <sup>a</sup>	6 314 ±9	1.85 ±0.08	8.94 ±0.43	2.33 ±0.15	0.60 ±0.06	1.11 ±0.03	1.32 ±0.07	0.57 ±0.07	25.5 ±4.2	10.4 ±1.2
	5	6 318 ±30	1.92 ±0.08	8.97 ±1.21	2.56 ±0.11	0.56 ±0.10	1.10 ±0.12	1.28 ±0.04	0.67 ±0.15	19.3 ** ±2.4	10.0 ±1.4
	10	6 288 ±22	1.94 ±0.09	7.57 ±0.60	2.27 ±0.22	0.56 ±0.08	1.00 ±0.10	1.21 ±0.10	0.52 ±0.10	20.5 * ±1.9	10.1 ±1.0
Relative <sup>c</sup>	0 <sup>a</sup>	6 299 ±36	1.94 ±0.08	8.51 ±1.55	2.39 ±0.24	0.56 ±0.13	1.06 ±0.14	1.21 ±0.10	0.49 ±0.09	23.2 ±3.0	10.9 ±1.4
	20	6 257 ±29	1.90 ±0.08	6.32 # ±0.76	2.07 # ±0.12	0.50 ±0.08	0.96 ±0.14	1.13 ±0.06	0.47 ±0.06	21.4 ±2.3	9.6 ±1.0
	0 <sup>b</sup>	6 314 ±9	0.59 ±0.03	2.84 ±0.12	0.74 ±0.03	0.19 ±0.01	0.35 ±0.01	0.42 ±0.02	0.18 ±0.02	8.2 ±1.5	3.3 ±0.4
Relative <sup>c</sup>	5	6 318 ±30	0.61 ±0.05	2.82 ±0.20	0.81 ±0.05	0.18 ±0.01	0.35 ±0.02	0.40 ±0.03	0.21 ±0.04	6.1 * ±0.8	3.2 ±0.2
	10	6 288 ±22	0.68 ±0.06	2.63 ±0.08	0.79 ±0.06	0.19 ±0.03	0.35 ±0.02	0.42 ±0.03	0.18 ±0.03	7.2 ±0.8	3.5 ±0.3
	0 <sup>b</sup>	6 299 ±36	0.65 ±0.06	2.83 ±0.20	0.80 ±0.04	0.19 ±0.02	0.35 ±0.01	0.41 ±0.03	0.16 ±0.02	8.0 ±1.8	3.7 ±0.2
Relative <sup>c</sup>	20	6 257 ±29	0.75 # ±0.08	2.47 # ±0.29	0.81 ±0.05	0.19 ±0.02	0.37 ±0.04	0.44 ±0.04	0.18 ±0.02	8.4 ±1.0	3.7 ±0.2

Each value is expressed as mean ± S.D.

a) : Control I ; b) : Control II

c) : Relative organ weight per 100g body weight

\*:Significantly different from control I at 5% level of probability

\*\*:Significantly different from control I at 1% level of probability

#:Significantly different from control II at 5% level of probability

Table 14

Conc. in diet(%)	No. of Animals	B.W. (g)	Adrenal (mg)	Testis (g)	Prost. (g)	Semiv. (g)	Epidid. (g)
Absolute	0 <sup>a</sup>	6 314 ±9	53.5 ±5.1	2.65 ±0.15	0.46 ±0.07	1.46 ±0.17	0.72 ±0.05
	5	6 318 ±30	51.0 ±7.2	2.64 ±0.15	0.43 ±0.07	1.33 ±0.17	0.68 ±0.02
	10	6 288 ±22	52.3 ±5.2	2.74 ±0.19	0.42 ±0.05	1.25 ±0.16	0.69 ±0.07
Relative <sup>c</sup>	0 <sup>a</sup>	6 299 ±36	51.2 ±6.5	2.65 ±0.17	0.49 ±0.11	1.40 ±0.25	0.71 ±0.06
	20	6 257 ±29	43.7 # ±4.4	2.58 ±0.17	0.30 ## ±0.04	1.09 # ±0.11	0.63 # ±0.03
	0 <sup>b</sup>	6 314 ±9	17.0 ±1.3	0.84 ±0.04	0.15 ±0.02	0.46 ±0.04	0.23 ±0.02
Relative <sup>c</sup>	5	6 318 ±30	16.1 ±2.0	0.84 ±0.09	0.14 ±0.02	0.42 ±0.05	0.22 ±0.02
	10	6 288 ±22	18.3 ±2.5	0.95 ±0.08	0.15 ±0.02	0.44 ±0.06	0.24 ±0.01
	0 <sup>b</sup>	6 299 ±36	17.2 ±1.5	0.89 ±0.09	0.16 ±0.03	0.47 ±0.06	0.24 ±0.03
Relative <sup>c</sup>	20	6 257 ±29	17.1 ±2.0	1.02 ±0.11	0.12 ## ±0.02	0.42 ±0.03	0.25 ±0.03

Each value is expressed as mean ± S.D.

a) : Control I ; b) : Control II

c) : Relative organ weight per 100g body weight

#:Significantly different from control II at 5% level of probability

Table 13-2 Absolute and relative organ weights of male rats fed dry beef-contained diet in a 28-day dose range-finding study

Conc. in diet(%)	No. of Animals	B.W. (g)	Adrenal (mg)	Testis (g)	Prost. (g)	Semiv. (g)	Epidid. (g)
Absolute	0 <sup>a</sup>	6 314 ±9	53.5 ±5.1	2.65 ±0.15	0.46 ±0.07	1.46 ±0.17	0.72 ±0.05
	5	6 318 ±30	51.0 ±7.2	2.64 ±0.15	0.43 ±0.07	1.33 ±0.17	0.68 ±0.02
	10	6 288 ±22	52.3 ±5.2	2.74 ±0.19	0.42 ±0.05	1.25 ±0.16	0.69 ±0.07
Relative <sup>c</sup>	0 <sup>a</sup>	6 299 ±36	51.2 ±6.5	2.65 ±0.17	0.49 ±0.11	1.40 ±0.25	0.71 ±0.06
	20	6 257 ±29	43.7 # ±4.4	2.58 ±0.17	0.30 ## ±0.04	1.09 # ±0.11	0.63 # ±0.03
	0 <sup>b</sup>	6 314 ±9	17.0 ±1.3	0.84 ±0.04	0.15 ±0.02	0.46 ±0.04	0.23 ±0.02
Relative <sup>c</sup>	5	6 318 ±30	16.1 ±2.0	0.84 ±0.09	0.14 ±0.02	0.42 ±0.05	0.22 ±0.02
	10	6 288 ±22	18.3 ±2.5	0.95 ±0.08	0.15 ±0.02	0.44 ±0.06	0.24 ±0.01
	0 <sup>b</sup>	6 299 ±36	17.2 ±1.5	0.89 ±0.09	0.16 ±0.03	0.47 ±0.06	0.24 ±0.03
Relative <sup>c</sup>	20	6 257 ±29	17.1 ±2.0	1.02 ±0.11	0.12 ## ±0.02	0.42 ±0.03	0.25 ±0.03

Each value is expressed as mean ± S.D.

a) : Control I ; b) : Control II

c) : Relative organ weight per 100g body weight

#:Significantly different from control II at 5% level of probability

##:Significantly different from control II at 1% level of probability

ble 14

Absolute and relative organ weights of female rats fed dry beef-contained diet in a 28-day dose range-finding study

	Conc. in diet(%)	No. of Animals	B.W. (g)	Brain (g)	Liver (g)	Kidney (g)	Spleen (g)	Heart (g)	Lung (g)	Thymus (g)	Thyr. (mg)	Pitui (mg)	Adrenal (mg)	Ovary (mg)	Uterus (g)
absolute	0 <sup>a</sup>	6	204 ± 14	1.78 ± 0.08	6.09 ± 0.75	1.75 ± 0.14	0.43 ± 0.08	0.74 ± 0.07	0.97 ± 0.05	0.49 ± 0.11	20.5 ± 2.2	13.1 ± 2.2	55.8 ± 6.3	67.4 ± 5.8	0.47 ± 0.11
	5	6	208 ± 16	1.80 ± 0.07	6.16 ± 0.88	1.67 ± 0.18	0.45 ± 0.08	0.77 ± 0.10	1.03 ± 0.06	0.46 ± 0.06	20.5 ± 3.5	13.3 ± 2.0	52.5 ± 9.4	73.8 ± 14.9	0.48 ± 0.14
	10	6	198 ± 15	1.83 ± 0.07	5.40 ± 0.56	1.65 ± 0.19	0.43 ± 0.06	0.71 ± 0.03	0.98 ± 0.05	0.45 ± 0.05	20.6 ± 1.6	13.2 ± 1.3	56.9 ± 7.5	76.6 ± 13.2	0.46 ± 0.11
	0 <sup>b</sup>	6	215 ± 17	1.83 ± 0.06	6.31 ± 0.81	1.74 ± 0.20	0.42 ± 0.05	0.76 ± 0.08	1.00 ± 0.09	0.52 ± 0.08	21.4 ± 2.2	13.5 ± 2.7	62.5 ± 8.4	73.9 ± 7.4	0.54 ± 0.19
	20	6	203 ± 19	1.81 ± 0.03	5.39 ± 0.74	1.63 ± 0.11	0.43 ± 0.14	0.75 ± 0.09	0.99 ± 0.10	0.49 ± 0.10	20.1 ± 2.0	12.9 ± 1.8	53.8 ± 8.6	69.0 ± 10.4	0.45 ± 0.12
	relative <sup>c</sup>	6	204 ± 14	0.88 ± 0.07	2.98 ± 0.19	0.86 ± 0.07	0.21 ± 0.03	0.36 ± 0.03	0.48 ± 0.04	0.24 ± 0.05	10.1 ± 1.4	6.4 ± 0.9	27.4 ± 2.2	33.1 ± 2.7	0.23 ± 0.06
relative	5	6	208 ± 16	0.87 ± 0.04	2.96 ± 0.26	0.80 ± 0.04	0.22 ± 0.03	0.37 ± 0.02	0.50 ± 0.04	0.22 ± 0.04	10.0 ± 1.9	6.4 ± 0.6	25.2 ± 3.3	35.5 ± 6.5	0.23 ± 0.07
	10	6	198 ± 15	0.93 ± 0.09	2.72 ± 0.13	0.83 ± 0.05	0.22 ± 0.02	0.36 ± 0.02	0.50 ± 0.02	0.23 ± 0.02	10.5 ± 1.1	6.7 ± 0.5	28.8 ± 2.9	38.8 ± 6.7	0.23 ± 0.05
	0 <sup>b</sup>	6	215 ± 17	0.86 ± 0.04	2.93 ± 0.17	0.81 ± 0.05	0.20 ± 0.03	0.36 ± 0.03	0.47 ± 0.03	0.25 ± 0.04	10.1 ± 1.8	6.3 ± 0.8	29.1 ± 3.2	34.4 ± 1.9	0.25 ± 0.08
	20	6	203 ± 19	0.90 ± 0.08	2.65 # ± 0.18	0.81 ± 0.06	0.21 ± 0.06	0.37 ± 0.02	0.49 ± 0.03	0.24 ± 0.05	10.0 ± 0.8	6.4 ± 0.5	26.6 ± 4.0	34.0 ± 3.1	0.22 ± 0.06

ach value is expressed as mean ± S.D.

): Control I ; b): Control II

): Relative organ weight per 100g body weight

Significantly different from control II at 5% level of probability

Appendix 2 Individual body weights of female rats fed the dry beef-contained diet in a 28day dose range-finding test

Conc. in diet	Animal number	(g)				
		Day 0	7	14	21	28
0% <sup>a)</sup>	501	111	143	167	187	203
	502	112	143	172	197	223
	503	121	144	169	197	210
	504	114	155	185	215	242
	505	122	151	187	210	229
	506	116	141	161	183	201
	Mean	116	146	174	198	218
5%	507	104	132	154	181	196
	508	120	151	166	216	235
	509	113	145	168	196	220
	510	113	140	162	188	212
	511	124	176	196	219	245
	512	118	148	178	206	227
	Mean	115	149	171	201	223
10%	513	112	142	165	180	186
	514	109	139	162	179	188
	515	122	150	180	191	214
	516	114	137	177	206	217
	517	116	149	180	200	221
	518	119	154	185	214	231
	Mean	115	145	175	195	210
0% <sup>b)</sup>	519	105	134	164	193	210
	520	120	159	194	218	248
	521	111	136	168	189	206
	522	124	160	187	217	240
	523	116	151	182	208	235
	524	118	150	187	219	246
	Mean	116	148	180	207	231
20%	525	113	145	179	208	229
	526	125	150	182	210	224
	527	118	140	166	191	202
	528	109	143	172	198	216
	529	111	131	146	165	187
	530	120	163	196	210	244
	Mean	116	145	174	197	217

a):Control I b):Control II

Appendix 1 Individual body weights of male rats fed the dry beef-contained diet in a 28day dose range-finding test

Conc. in diet	Animal number	(g)				
		Day 0	7	14	21	28
0% <sup>a)</sup>	001	117	172	233	285	334
	002	121	176	228	285	328
	003	125	184	249	298	341
	004	122	171	231	287	330
	005	115	170	234	300	352
	006	126	180	241	290	322
	Mean	121	176	236	291	335
5%	007	122	177	228	274	308
	008	113	173	223	275	317
	009	129	196	264	336	385
	010	125	184	242	301	349
	011	122	179	241	309	365
	012	118	179	235	281	314
	Mean	122	181	239	296	340
10%	013	117	166	215	257	285
	014	124	174	221	274	311
	015	111	163	213	259	296
	016	129	182	241	300	336
	017	121	171	232	299	286
	018	122	176	236	292	335
	Mean	121	172	226	280	308
0% <sup>b)</sup>	019	116	166	227	285	321
	020	121	182	238	293	330
	021	125	190	258	323	375
	022	116	185	247	254	252
	023	124	178	228	271	306
	024	127	180	239	291	330
	Mean	122	180	240	286	319
20%	025	123	176	225	256	258
	026	121	158	194	221	241
	027	125	166	211	259	295
	028	128	180	242	296	329
	029	116	152	191	225	252
	030	114	152	187	221	249
	Mean	121	164	208	246	271

a):Control I b):Control II

Appendix 4 Individual food consumption of female rats fed the dry beef-contained diet in a 28day dose range-finding test

Conc. in diet	Cage number	week				(g/day/rat)
		1	2	3	4	
0% <sup>a)</sup>	16	13	13	15	15	
	17	13	14	16	16	
	18	14	16	14	13	
	Mean	13	14	15	15	
5%	19	12	10	16	14	
	20	12	15	15	16	
	21	16	14	16	14	
	Mean	13	13	15	15	
10%	22	13	12	11	14	
	23	14	15	14	12	
	24	14	14	17	14	
	Mean	14	14	14	13	
0% <sup>b)</sup>	25	14	14	15	16	
	26	14	14	15	13	
	27	13	15	15	16	
	Mean	14	14	15	15	
20%	28	14	15	14	15	
	29	12	14	13	13	
	30	13	13	12	13	
	Mean	13	14	13	14	

a):Control I    b):Control II

Appendix 3 Individual food consumption of male rats fed the dry beef-contained diet in a 28day dose range-finding test

Conc. in diet	Cage number	week				(g/day/rat)
		1	2	3	4	
0% <sup>a)</sup>	1	17	20	21	21	
	2	18	21	22	22	
	3	18	22	24	22	
	Mean	18	21	22	22	
5%	4	16	17	18	18	
	5	19	20	24	23	
	6	18	21	21	22	
	Mean	18	19	21	21	
10%	7	17	18	18	17	
	8	17	19	20	19	
	9	18	20	22	19	
	Mean	17	19	20	18	
0% <sup>b)</sup>	10	16	18	21	17	
	11	18	21	20	17	
	12	17	17	18	17	
	Mean	17	19	20	17	
20%	13	17	18	15	9	
	14	17	21	21	17	
	15	15	15	16	18	
	Mean	16	18	17	15	

a):Control I    b):Control II

?

**Appendix 5 - 1** Individual urinary findings of male rats fed the dry beef-contained diet in a 28day dose range-finding test

Conc. in diet	Animal number	Color	Cloudy	pH	Protein	Glucose	Ketone body	Occult blood	Urobilinogen	Bilirubin	Conc. in diet
0% <sup>a)</sup>	001	PY	-	6.5	+	-	+	-	0.1	-	0% <sup>a)</sup>
	002	PY	-	6.0	±	-	-	-	0.1	-	
	003	PY	-	6.0	-	-	-	-	0.1	-	
	004	PY	-	6.0	-	-	-	-	0.1	-	
	005	PY	-	6.0	±	-	±	-	0.1	-	
	006	PY	-	6.0	±	-	-	-	0.1	-	
5%	007	PY	-	6.0	±	-	-	-	0.1	-	5%
	008	PY	-	6.0	±	-	-	-	0.1	-	
	009	PY	-	6.0	±	-	-	-	0.1	-	
	010	PY	-	6.0	-	-	-	-	0.1	-	
	011	PY	-	6.0	-	-	±	-	0.1	-	
	012	PY	-	6.0	-	-	-	-	0.1	-	
10%	013	PY	-	6.5	±	-	-	-	0.1	-	10%
	014	PY	-	6.0	±	-	±	-	0.1	-	
	015	PY	-	6.0	±	-	-	-	0.1	-	
	016	PY	-	6.0	±	-	-	-	0.1	-	
	017	PY	-	7.0	+	-	-	+	0.1	-	
	018	PY	-	6.0	-	-	-	+	0.1	-	

Color : PY(pale yellow)

Cloudy : -(negligible)

Protein : -(negligible), ±(15~30mg/dL), +(30mg/dL)

Glucose : -(negligible)

Ketone body : -(negligible), ±(5mg/dL)

Occult blood : -(negligible), ±(trace), +(slight)

Urobilinogen : Ehrlich unit/dL

Bilirubin : -(negligible)

a) : Control I

Color : PY

Cloudy :

Protein :

Glucose :

Ketone b:

Occult bl:

Urobilino

Bilirubin

a) : Contr

**Appendix 5 - 2** Individual urinary findings of male rats fed the dry beef-contained diet in a 28day dose range-finding test

Conc. in diet	Animal number	Color	Cloudy	pH	Protein	Glucose	Ketone body	Occult blood	Urobilinogen	Bilirubin	Conc. in diet
0% <sup>b)</sup>	019	PY	-	6.0	+	-	-	-	0.1	-	0% <sup>b)</sup>
	020	PY	-	6.0	±	-	-	-	0.1	-	
	021	PY	-	6.0	+	-	-	-	0.1	-	
	022	PY	-	6.0	+	-	-	-	0.1	-	
	023	PY	-	6.0	-	-	-	-	0.1	-	
	024	PY	-	6.0	±	-	-	-	0.1	-	
20%	025	PY	-	6.5	-	-	-	±	0.1	-	20%
	026	PY	-	6.0	±	-	-	-	0.1	-	
	027	PY	-	6.0	+	-	-	-	0.1	-	
	028	PY	-	6.0	-	-	-	-	0.1	-	
	029	PY	-	6.0	-	-	-	-	0.1	-	
	030	PY	-	6.0	+	-	-	-	0.1	-	

b) : Control II

b) : Con

## Appendix 6 · 1

Individual urinary findings of female rats fed the dry beef-contained diet  
in a 28day dose range-finding test

Conc. in diet	Animal number	Color	Cloudy	pH	Protein	Glucose	Ketone body	Occult blood	Urobilinogen	Bilirubin
0% <sup>a)</sup>	501	PY	-	6.0	±	-	-	-	0.1	-
	502	PY	-	6.0	±	-	-	-	0.1	-
	503	PY	-	6.0	-	-	-	-	0.1	-
	504	PY	-	6.5	±	-	-	-	0.1	-
	505	PY	-	6.0	-	-	-	-	0.1	-
	506	PY	-	6.0	±	-	-	-	0.1	-
5%	507	PY	-	7.0	-	-	-	-	0.1	-
	508	PY	-	6.0	-	-	-	-	0.1	-
	509	PY	-	6.5	-	-	-	-	0.1	-
	510	PY	-	6.6	-	-	-	+	0.1	-
	511	PY	-	6.0	±	-	-	±	0.1	-
	512	PY	-	6.0	-	-	-	±	0.1	-
10%	513	PY	-	7.5	+	-	-	-	0.1	-
	514	PY	-	6.0	-	-	-	-	0.1	-
	515	PY	-	6.0	±	-	-	-	0.1	-
	516	PY	-	7.0	-	-	-	-	0.1	-
	517	PY	-	6.0	±	-	-	-	0.1	-
	518	PY	-	7.0	-	-	-	-	0.1	-

Color : PY(pale yellow)

Cloudy : - (negligible)

Protein : - (negligible), ±(15~30mg/dL), + (30mg/dL)

Glucose : - (negligible)

Ketone body : - (negligible)

Occult blood : - (negligible), ±(trace), + (slight)

Urobilinogen : Ehrlich unit/dL

Bilirubin : - (negligible)

a) : Control I

## Appendix 6 · 2

Individual urinary findings of female rats fed the dry beef-contained diet  
in a 28day dose range-finding test

Conc. in diet	Animal number	Color	Cloudy	pH	Protein	Glucose	Ketone body	Occult blood	Urobilinogen	Bilirubin
0% <sup>b)</sup>	519	PY	-	7.6	±	-	-	-	0.1	-
	520	PY	-	6.0	-	-	-	-	0.1	-
	521	PY	-	6.0	±	-	-	-	0.1	-
	522	PY	-	6.0	-	-	-	-	0.1	-
	523	PY	-	6.5	±	-	-	±	0.1	-
	524	PY	-	6.0	±	-	-	-	0.1	-
20%	525	PY	-	6.5	-	-	-	-	0.1	-
	526	PY	-	6.0	-	-	-	-	0.1	-
	527	PY	-	6.0	-	-	-	-	0.1	-
	528	PY	-	7.5	±	-	-	-	0.1	-
	529	PY	-	6.0	-	-	-	-	0.1	-
	530	PY	-	6.0	±	-	-	-	0.1	-

b) : Control II

Appendix 7-1 Individual hematological findings of male rats fed the dry beef-contained diet in a 28day dose range-finding test

Conc. in diet	Animal number	RBC (10 <sup>6</sup> /μL)	Hb (g/dL)	Ht (%)	MCV (fL)	MCH (pg)	MCHC (%)	PT (sec)	APTT (sec)	WBC (10 <sup>3</sup> /μL)
0%*	001	711	13.7	39.3	55	19.3	34.9	13.2	21.7	69
	002	777	13.2	38.6	50	17.0	34.2	12.9	17.9	55
	003	749	15.0	42.3	56	20.0	35.5	12.9	20.2	58
	004	739	13.3	39.2	53	18.0	33.9	12.3	18.6	67
	005	721	14.3	42.4	59	19.8	33.7	13.0	17.4	55
	006	722	14.4	42.6	59	19.9	33.9	12.6	20.7	53
	Mean	737	14.0	40.7	55	19.0	34.4	12.8	19.4	60
5%	007	794	14.8	42.2	53	18.5	35.1	12.9	18.5	85
	008	784	14.3	42.0	54	18.2	34.0	13.6	19.0	32
	009	739	13.8	40.8	55	18.7	33.8	13.8	18.7	57
	010	780	14.5	43.1	55	18.6	33.6	13.5	17.5	46
	011	761	15.4	44.0	58	20.2	35.0	13.2	20.8	88
	012	780	14.5	42.8	55	18.6	33.9	13.0	18.4	64
	Mean	773	14.6	42.5	55	18.8	34.2	13.3	18.8	62
10%	013	792	15.1	42.3	53	19.1	35.7	13.0	20.8	45
	014	699	14.6	40.1	57	20.9	36.4	14.4	20.2	46
	015	727	14.4	42.1	58	19.8	34.2	13.3	19.9	54
	016	776	14.7	42.8	55	18.9	34.3	12.8	18.3	39
	017	618	11.5	34.3	56	18.6	33.5	14.7	18.4	46
	018	771	14.7	43.6	57	19.1	33.7	13.2	17.1	42
	Mean	731	14.2	40.9	58	19.4	34.6	13.6	19.1	46
0%*	019	794	13.1	39.1	49	16.5	33.5	12.8	16.8	49
	020	768	14.3	41.4	55	18.9	34.5	12.4	16.7	69
	021	696	14.6	42.5	61	21.0	34.4	13.6	18.6	67
	022	820	15.8	46.5	57	19.3	34.0	15.2	23.4	32
	023	707	14.7	43.2	61	20.8	34.0	13.3	22.7	31
	024	762	14.8	44.2	68	19.4	33.5	13.4	20.1	67
	Mean	756	14.6	42.8	57	19.3	34.0	13.4	19.7	51
20%	025	718	10.0	32.2	46	13.9	31.1	13.9	16.7	32
	026	820	15.4	44.1	54	18.8	34.9	14.1	16.3	26
	027	822	15.5	43.2	53	18.9	35.9	13.4	19.3	47
	028	916	14.6	42.4	46	15.9	34.4	13.4	18.1	51
	029	807	14.7	42.5	53	18.2	34.6	13.6	18.8	31
	030	847	15.4	43.8	52	18.2	35.2	13.4	17.8	43
	Mean	822	14.3	41.4	51	17.3	34.4	13.6	18.2	38

a) : Control I, b) : Control II

Appendix 7-2 Individual hematological findings of male rats fed the dry beef-contained diet in the 28-day repeat dose toxicity test

Conc. in diet	Animal number	Differential leukocyte counts (%)							Plat. (10 <sup>3</sup> /μL)
		Baso.	Eosin.	Neutro.	Seg.	Lymph.	Mono.	Other	
0%*	001	0	1	0	14	83	2	0	130
	002	1	0	0	10	87	2	0	138
	003	0	0	0	16	83	1	0	128
	004	0	2	0	22	74	2	0	146
	005	0	1	0	16	80	3	0	119
	006	0	0	0	8	92	0	0	130
	Mean	0	1	0	14	83	2	0	132
5%	007	0	0	0	20	78	2	0	137
	008	0	0	0	10	87	3	0	126
	009	0	1	0	10	88	1	0	96
	010	0	0	0	12	87	1	0	131
	011	0	1	0	19	80	0	0	106
	012	0	1	0	13	86	0	0	116
	Mean	0	1	0	14	84	1	0	119
10%	013	0	1	0	12	86	1	0	125
	014	0	0	0	8	92	0	0	122
	015	0	1	0	7	90	2	0	127
	016	0	0	0	12	87	1	0	131
	017	0	0	0	19	77	4	0	239
	018	0	4	0	12	83	1	0	113
	Mean	0	1	0	12	86	2	0	143
0%*	019	0	0	0	12	88	0	0	128
	020	0	0	0	11	87	2	0	110
	021	0	1	0	22	76	1	0	97
	022	0	1	0	17	80	2	0	142
	023	0	0	1	18	81	0	0	142
	024	0	0	0	12	87	1	0	124
	Mean	0	0	0	15	83	1	0	124
20%	025	0	0	0	7	92	1	0	234
	026	0	0	0	11	89	0	0	126
	027	0	2	0	13	84	1	0	104
	028	0	1	0	15	83	1	0	102
	029	0	0	0	15	83	2	0	123
	030	0	1	0	12	87	0	0	114
	Mean	0	1	0	12	86	1	0	134

a) : Control I, b) : Control II

Appendix  
Conc. in  
diet  
0%\*

5%

10%

0%\*

20%

a) : Contro-

## Appendix 8

Individual hematological findings of female rats fed the dry beef-contained diet in a 28day dose range-finding test

Conc. in diet	Animal number	RBC (10 <sup>9</sup> /μL)	Hb (g/dL)	Ht (%)	MCV (fL)	MCH (pg)	MCHC (%)	WBC (10 <sup>3</sup> /μL)	Plat. (10 <sup>3</sup> /μL)	PT (sec)	APTT (sec)
0% <sup>a)</sup>	501	766	14.7	40.7	53	19.2	36.1	29	111	12.9	17.1
	502	717	14.7	40.7	57	20.5	36.1	31	108	13.1	20.5
	503	780	15.0	42.4	54	19.2	35.4	42	100	12.6	16.6
	504	751	14.9	42.6	57	19.8	35.0	42	107	12.3	18.3
	505	758	15.4	42.1	56	20.3	36.6	35	94	12.7	17.7
	506	800	15.5	43.7	55	19.4	35.5	43	111	13.2	18.4
	Mean	762	15.0	42.0	56	19.7	35.8	37	104	12.8	18.1
5%	507	780	18.1	42.0	54	19.4	36.0	38	137	12.9	17.4
	508	766	14.2	41.2	54	18.5	34.5	28	123	13.2	17.5
	509	762	14.6	42.4	56	19.2	34.4	19	121	12.6	18.1
	510	797	14.9	42.7	54	18.7	34.9	44	129	13.3	15.3
	511	761	15.4	43.0	57	20.2	35.8	104	100	12.8	18.1
	512	734	14.8	41.9	57	20.2	35.3	44	111	12.7	19.6
	Mean	767	14.8	42.2	55	19.4	35.2	46	120	12.9	17.7
10%	513	827	15.1	43.0	62	18.3	35.1	28	125	12.7	17.6
	514	821	15.6	44.0	54	19.0	35.5	23	123	12.4	17.3
	515	751	15.4	42.2	56	20.5	36.5	22	115	13.1	18.1
	516	772	15.0	43.3	56	19.4	34.6	33	131	13.4	18.8
	517	811	15.9	44.1	54	19.6	36.1	38	143	12.7	18.4
	518	739	14.9	42.2	57	20.2	36.3	28	118	13.4	18.0
	Mean	787	15.3	43.1	55	19.6	35.5	29	126	13.0	18.0
0% <sup>b)</sup>	519	756	15.4	44.0	58	20.4	36.0	26	105	13.4	19.0
	520	718	14.8	42.2	59	20.6	35.1	46	121	12.5	17.3
	521	776	15.8	43.2	56	20.4	36.6	38	141	14.2	16.8
	522	738	15.5	43.5	59	21.0	35.6	21	110	12.9	16.1
	523	769	15.1	43.3	56	19.8	34.9	39	101	13.1	20.5
	524	728	15.0	41.6	57	20.6	36.1	32	106	13.3	18.8
	Mean	748	15.3	43.0	58	20.4	35.6	34	114	13.2	18.1
20%	525	769	13.8	38.6	51	18.2	36.8	26	126	12.4	18.5
	526	804	15.3	43.3	54	19.0	35.3	48	132	13.1	18.9
	527	794	15.0	42.0	53	18.9	35.7	25	113	13.2	17.6
	528	748	14.3	40.3	54	19.1	35.5	23	123	12.7	18.7
	529	753	15.0	42.5	56	19.9	36.3	43	100	13.1	17.9
	530	730	12.0	38.0	52	16.4	31.6	34	151	13.0	18.2
	Mean	765	14.2	40.8	53	18.6	34.9	33	124	12.9	18.3

a) : Control I, b) : Control II

## Appendix 9 · 1

Individual blood biochemical findings of male rats fed the dry beef-contained diet in a 28day dose range-finding test

Conc. in diet	Animal number	LDH (U/L)	GOT (U/L)	GPT (U/L)	ALP (U/L)	Y-GTP (U/L)	ChE (U/L)	CK (U/L)	T.P. (g/dL)	Alb (%)	α <sub>1</sub> -G (%)	α <sub>2</sub> -G (%)	α <sub>3</sub> -G (%)	B-G (%)	Y-G (%)	A/G
0% <sup>a)</sup>	001	337	88	34	843	0.99	59	229	5.58	49.7	21.1	5.6	3.4	15.7	4.5	0.99
	002	344	87	33	630	0.63	45	252	6.06	49.4	22.6	6.6	3.5	13.8	4.1	0.98
	003	267	74	29	472	0.38	45	242	6.06	51.8	21.2	5.4	2.6	14.7	4.3	1.07
	004	587	82	29	807	0.68	66	239	5.61	48.9	25.3	4.1	3.1	14.5	4.1	0.96
	005	267	90	30	764	0.53	45	218	5.76	54.5	23.4	5.1	2.8	12.6	2.1	1.20
	006	188	69	25	480	0.23	42	157	5.98	49.6	23.1	6.4	2.6	14.3	4.0	0.98
	Mean	323	82	30	666	0.56	50	223	5.84	50.7	22.8	5.6	2.9	14.3	3.9	1.03
5%	007	377	79	30	737	0.58	60	284	5.92	49.8	21.2	7.2	3.1	14.6	4.1	0.99
	008	227	84	30	871	0.40	48	378	5.53	54.4	21.8	4.7	3.2	12.5	3.4	1.19
	009	129	77	27	530	0.32	54	154	5.54	52.5	21.4	5.7	2.3	15.0	3.1	1.11
	010	242	66	25	785	0.46	45	164	5.93	53.8	23.2	6.4	2.4	13.1	2.1	1.16
	011	183	65	28	865	0.43	42	181	6.39	53.0	21.0	7.0	3.5	12.8	2.7	1.13
	012	270	77	29	627	0.66	56	179	5.97	52.2	22.9	5.8	2.3	13.1	3.7	1.09
	Mean	238	75	28	736	0.47	49	220	5.88	52.6	21.9	6.0	2.8	13.5	3.2	1.11
10%	013	462	80	30	733	0.13	36	258	5.96	64.1	21.4	4.6	3.0	12.6	4.3	1.18
	014	344	89	31	757	0.22	48	320	5.84	54.7	23.1	4.8	2.8	11.9	2.7	1.21
	015	223	79	29	933	0.35	45	327	5.80	49.3	19.3	7.6	3.4	15.2	5.2	0.97
	016	443	66	32	826	0.20	48	239	5.79	41.7	27.7	5.0	2.5	20.0	3.1	0.72
	017	244	56	37	541	0.29	32	328	6.06	59.1	25.1	3.8	1.4	9.6	1.0	1.44
	018	349	74	34	1005	0.03	36	253	5.50	54.2	22.7	5.5	3.1	10.8	3.7	1.18
	Mean	344	74	32	799	0.20	41	288	5.83	52.2	23.2	5.2	2.7	13.4	3.3	1.12
0% <sup>b)</sup>	019	347	81	33	674	0.52	61	277	5.88	48.3	28.2	5.4	3.8	10.2	4.1	0.93
	020	393	79	26	660	0.31	48	246	6.08	49.8	26.5	3.5	3.1	12.5	4.6	0.99
	021	409	72	26	706	0.30	39	202	5.78	51.9	23.0	5.2	2.9	11.6	5.4	1.08
	022	337	90	31	1277	0.83	41	307	5.83	51.6	24.0	4.2	3.7	11.9	4.6	1.07
	023	449	84	26	351	0.09	52	196	5.80	48.2	28.6	4.4	2.5	12.2	4.1	0.93
	024	484	83	28	604	0.38	63	263	5.97	51.7	13.7	6.9	4.6	18.8	4.3	1.07
	Mean	403	82	28	710	0.41	51	249	5.89	50.3	24.0	4.9	3.4	12.9	4.5	1.01
20%	025	265	84	30	1161	0.18	35	289	5.80	50.2	18.0	8.3	6.2	14.6	5.7	1.01
	026	573	74	24	1124	0.54	43	210	5.60	48.6	19.7	6.8	4.6	16.0	5.3	0.95
	027	483	89	31	954	0.11	42	319	5.74	50.9	23.8	6.2	2.9	13.2	3.0	1.04
	028	150	114	37	1145	0.55	45	172	5.53	54.6	21.7	4.8	2.6	12.6	3.7	1.20
	029	177	94	31	799	0.67	39	145	5.60	54.9	20.3	5.8	2.9	12.4	3.7	1.22
	030	385	121	39	1341	1.28	40	222	5.91	49.8	22.6	3.6	3.7	15.7	4.6	0.99
	Mean	339	96	32	1086	0.55	41	228	5.66	51.5	21.0	5.6	3.7	13.9	4.3	1.07

a) : Control I, b) : Control II

## Appendix 9-2

Individual blood biochemical findings of male rats fed the dry beef-contained diet in a 28day dose range-finding test

Conc. in diet	Animal number	T-Chol.	T.G.	PL	Glut.	BUN	UA	Crea.	T-Bil.	Ca	P	Na	K	Cl	Conc. diet
0% <sup>a)</sup>	001	45	39	81	102	13.3	1.10	0.60	0.24	9.3	7.1	145	4.29	106	0%
	002	70	104	111	124	11.6	1.10	0.57	0.29	10.3	7.2	144	4.23	105	
	003	64	71	101	119	15.1	1.20	0.52	0.26	9.9	7.3	144	3.97	105	
	004	48	38	70	114	9.9	0.94	0.45	0.29	9.9	8.3	144	4.50	105	
	005	46	39	72	129	14.8	0.69	0.44	0.31	10.1	8.1	144	4.29	103	
	006	41	36	71	102	12.1	0.74	0.45	0.28	10.0	7.6	145	4.08	103	
	Mean	52	55	84	115	12.8	0.96	0.49	0.28	9.9	7.6	144	4.22	105	
5%	007	47	40	82	124	12.5	1.36	0.64	0.28	9.4	8.0	146	5.08	106	5%
	008	32	42	65	131	11.1	1.25	0.56	0.28	9.3	7.3	144	4.90	107	
	009	31	65	73	121	10.4	1.43	0.55	0.23	10.0	8.0	145	4.06	105	
	010	52	59	88	131	13.3	0.85	0.50	0.29	10.1	9.1	144	4.36	104	
	011	53	88	97	151	9.8	0.89	0.49	0.21	10.5	8.9	144	4.27	103	
	012	68	63	104	157	6.3	0.66	0.42	0.21	9.8	8.2	144	4.50	105	
	Mean	47	60	85	136	10.6	1.07	0.53	0.25	9.9	8.3	144	4.53	105	
10%	013	37	41	80	138	7.5	1.09	0.62	0.28	9.6	7.6	146	4.42	108	10%
	014	48	69	86	118	13.6	1.26	0.69	0.29	9.6	7.9	146	3.99	108	
	015	40	28	75	122	12.5	1.42	0.49	0.27	9.4	7.8	143	4.64	106	
	016	46	51	75	138	10.9	1.13	0.43	0.24	9.8	8.8	144	4.85	105	
	017	43	29	66	114	10.0	1.46	0.53	0.31	9.5	8.1	145	5.86	105	
	018	39	26	67	125	13.3	1.18	0.50	0.25	9.5	8.4	146	4.16	107	
	Mean	42	41	76	126	11.3	1.26	0.63	0.27	9.6	8.1	146	4.66	107	
0% <sup>b)</sup>	019	39	40	66	129	9.9	1.10	0.60	0.25	9.6	7.7	146	5.21	107	0%
	020	56	37	87	115	8.0	0.94	0.49	0.27	9.6	7.7	146	4.35	104	
	021	51	54	85	116	11.6	0.78	0.44	0.29	10.2	8.5	147	4.54	105	
	022	38	18	61	121	10.8	0.97	0.49	0.31	9.2	7.7	146	4.71	108	
	023	38	19	61	119	14.8	0.89	0.47	0.23	9.8	8.5	146	4.66	105	
	024	35	36	65	118	11.7	0.96	0.44	0.30	10.0	9.0	147	4.17	105	
	Mean	43	34	71	120	11.1	0.94	0.47	0.28	9.7	8.2	146	4.59	106	
20%	025	35	25	69	124	18.7	1.93	0.57	0.33	9.5	7.6	143	5.12	103	20%
	026	45	49	77	157	13.1	1.40	0.47	0.28	9.5	7.3	144	4.53	106	
	027	46	25	82	122	11.1	1.22	0.42	0.29	9.2	7.4	143	4.53	106	
	028	34	36	74	132	14.4	1.38	0.61	0.23	9.8	8.2	144	3.28	99	
	029	38	28	84	115	10.5	1.12	0.51	0.25	9.2	8.6	145	4.29	105	
	030	34	24	66	126	14.1	1.18	0.51	0.29	9.0	6.6	145	3.77	106	
	Mean	39	31	75	129	12.8	1.37	0.62	0.28	9.4	7.3	144	4.25	104	

a) : Control I, b) : Control II

Appen

0%

10%

0%

20%

a) : Cc

Appendix 10-1 Individual blood biochemical findings of female rats fed the dry beef-contained diet in a 28day dose range-finding test

Conc. in diet	Animal number	LDH	GOT	GPT	ALP	y-GTP	ChE	CK	T.P.	Alb	a <sub>1</sub> -G	a <sub>2</sub> -G	a <sub>3</sub> -G	B-G	y-G	A/G
0% <sup>a)</sup>	501	465	86	26	470	0.28	316	264	6.28	58.2	19.5	4.7	2.7	11.7	3.2	1.39
	502	319	79	22	340	0.46	187	148	5.95	58.4	15.9	6.5	2.5	13.1	3.6	1.40
	503	537	86	34	361	0.38	413	236	6.65	59.1	16.5	6.0	2.9	12.1	3.4	1.44
	504	247	88	29	410	0.51	260	125	6.40	56.3	20.8	5.7	3.0	11.9	2.5	1.29
	505	334	76	22	438	0.48	275	318	6.73	56.3	18.2	6.8	2.4	13.1	3.2	1.29
	506	368	88	25	472	0.85	189	237	6.02	58.2	20.0	5.4	2.4	13.4	2.6	1.28
	Mean	378	84	26	416	0.49	267	221	6.33	57.4	18.5	5.9	2.7	12.6	3.1	1.35
5%	507	557	78	27	484	0.63	252	290	5.98	57.3	18.0	6.2	2.6	12.4	3.5	1.34
	508	598	98	25	508	0.57	202	195	5.80	57.4	20.0	6.0	1.4	12.0	3.2	1.35
	509	341	73	25	366	0.30	440	170	6.74	58.5	18.5	5.7	2.8	10.6	3.9	1.41
	510	364	77	26	325	0.73	225	216	6.06	58.1	16.4	6.4	2.4	12.8	8.9	1.39
	511	573	72	22	397	0.33	392	192	6.70	52.7	21.2	5.9	3.1	13.1	4.0	1.11
	512	411	68	22	413	0.07	404	166	6.77	55.0	20.2	5.3	2.8	13.0	3.7	1.22
	Mean	474	78	25	416	0.44	319	205	6.34	56.5	19.1	5.9	2.6	12.3	3.7	1.30
10%	513	508	82	22	363	0.28	420	173	5.88	59.2	13.2	6.2	3.5	14.9	4.0	1.45
	514	632	99	25	505	0.37	375	213	6.08	57.3	18.1	4.5	3.9	12.4	3.8	1.34
	515	645	73	27	355	0.46	193	239	6.08	59.0	19.4	2.9	2.2	12.9	3.6	1.44
	516	517	80	21	359	0.30	378	214	6.45	61.7	17.8	2.5	1.2	13.0	3.8	1.61
	517	321	99	26	764	0.69	371	199	6.10	54.4	18.8	5.7	3.1	13.3	4.7	1.19
	518	686	88	23	444	1.11	356	273	6.52	56.6	19.3	3.9	2.7	12.3	5.2	1.30
	Mean	551	87	24	498	0.54	349	219	6.19	58.0	17.8	4.1	2.8	13.1	4.2	1.39
0% <sup>b)</sup>	519	672	86	26	460	0.37	299	192	5.90	60.1	17.5	4.7	2.2	12.1	3.4	1.61
	520	731	78	22	414	0.29	297	190	7.04	67.1	18.5	4.1	3.8	12.4	4.1	1.33
	521	219	74	27	377	0.48	190	142	6.17	62.4	19.2	4.7	1.6	10.9	1.2	1.66
	522	588	90	25	356	0.42	352	207	6.37	61.3	18.6	4.1	1.8	11.7	2.5	1.58
	523	676	80	27	459	0.83	186	204	6.34	58.8	19.0	3.3	1.8	13.0	4.1	1.43
	524	766	75	26	414	0.24	194	240	6.56	58.5	18.7	2.9	1.5	13.7	4.7	1.41
	Mean	609	81	26	413	0.44	253	196	6.40	59.7	18.6	4.0	2.1	12.3	3.3	1.49
20%	525	718	76	23	378	0.17	402	236	6.84	67.4	16.9	4.2	3.0	13.2	5.3	1.36
	526	649	74	26	504	0.11	336	233	6.63	59.7	18.5	5.0	1.4	13.5	1.9	1.48
	527	174	81	28	466	0.34	382	110	5.70	58.2	19.9	6.0	2.1	11.3	2.5	1.39
	528	642	85	25	537	0.21	483	332	6.63	58.7	17.9	6.7	2.0	12.3	2.4	1.42
	529	244	76	28	434	0.24	294	145	6.12	51.8	20.2	5.9	3.1	13.3	5.7	1.07
	530	546	78	24	452	0.28	329	314	6.30	55.1	19.2	6.9	2.0	12.9	3.9	1.23
	Mean	496	78	26	462	0.23	371	228	6.37	56.8	18.8	5.8	2.3	12.8	3.6	1.32

## Appendix 10-2

Individual blood biochemical findings of female rats fed the dry beef-contained diet in a 28-day dose range-finding test

Conc. in diet (%)	Animal number	T-Chol.	T.G.	PL	Glu.	BUN	UA	Crea.	T-Bil.	Ca	P	Na	K	Cl
0% <sup>a)</sup>	501	50	16	95	116	19.5	1.12	0.74	0.21	9.6	6.9	144	3.81	103
	502	36	14	77	133	18.3	0.87	0.67	0.29	9.3	6.9	142	4.29	108
	503	59	20	103	114	17.4	1.17	0.74	0.26	9.7	6.1	141	4.09	105
	504	63	30	113	113	12.3	0.57	0.57	0.27	10.2	8.0	144	3.65	104
	505	70	24	118	99	14.3	0.79	0.56	0.23	10.1	7.5	144	4.49	106
	506	49	15	89	129	16.9	0.82	0.55	0.26	9.5	6.7	144	4.33	109
	Mean	54	20	99	117	16.6	0.89	0.64	0.26	9.7	6.7	143	4.11	106
5%	507	48	13	81	105	18.0	1.49	0.70	0.26	9.6	6.3	142	4.46	109
	508	38	11	68	121	20.3	1.14	0.79	0.22	9.6	6.6	145	3.58	107
	509	60	42	110	135	11.7	0.97	0.61	0.27	10.0	5.2	145	4.45	105
	510	62	28	110	115	12.4	0.90	0.56	0.27	10.1	8.2	144	3.90	106
	511	50	14	96	128	12.8	1.62	0.62	0.31	9.8	7.4	144	4.46	107
	512	48	13	94	129	13.0	1.10	0.58	0.27	9.9	7.1	144	4.02	108
	Mean	51	20	93	122	14.7	1.20	0.63	0.27	9.8	6.8	144	4.14	107
10%	513	64	19	110	115	17.8	1.84	0.74	0.27	9.4	6.0	143	4.12	107
	514	66	12	114	105	18.9	1.07	0.72	0.24	9.4	6.2	145	4.19	111
	515	40	10	80	113	14.8	1.05	0.58	0.28	9.6	6.5	145	4.40	108
	516	45	11	81	106	10.5	1.05	0.59	0.22	9.7	6.7	145	4.40	109
	517	58	20	106	96	13.3	1.15	0.61	0.30	9.8	7.6	145	3.98	109
	518	41	8	80	109	15.2	1.13	0.70	0.29	9.4	6.8	145	4.57	113
	Mean	52	13	95	107	15.1	1.13	0.66	0.27	9.6	6.6	145	4.28	110
0% <sup>b)</sup>	519	54	16	96	94	13.4	0.91	0.59	0.21	9.5	6.6	145	4.84	109
	520	63	14	107	119	11.4	0.81	0.64	0.26	10.2	6.1	145	4.22	106
	521	49	19	86	125	17.8	0.75	0.59	0.26	9.6	6.2	144	4.07	107
	522	40	10	77	134	13.1	1.03	0.62	0.25	9.6	6.0	146	4.57	111
	523	50	9	86	124	13.8	0.84	0.61	0.26	9.7	7.5	146	4.16	107
	524	47	14	94	134	16.6	1.18	0.66	0.29	9.9	6.8	145	3.98	108
	Mean	51	14	91	122	14.2	0.92	0.60	0.26	9.8	6.4	145	4.27	108
20%	525	62	45	116	128	10.1	0.89	0.66	0.26	10.2	8.6	143	4.46	106
	526	44	15	91	123	16.7	1.05	0.77	0.26	9.9	7.2	148	3.57	106
	527	41	10	76	135	25.6	1.16	0.70	0.27	9.8	6.5	146	3.61	110
	528	30	12	69	126	15.1	1.22	0.60	0.24	9.9	6.1	145	4.86	109
	529	52	15	94	134	19.1	1.03	0.65	0.29	9.4	6.2	145	4.32	111
	530	48	20	94	119	20.0	1.73	0.71	0.30	9.8	7.7	144	5.92	108
	Mean	45	20	90	127	17.8	1.18	0.68	0.27	9.8	6.7	145	4.46	108

a) : Control I , b) : Control II

Appendix 11 Absolute organ weights of individual male rats fed dry beef-contained diet in a 28-day dose range-finding study

Conc. in diet (%)	Animal numbers	B.W. (g)	Brain (g)	Liver (g)	Kidney (g)	Spleen (g)	Heart (g)	Lung (g)	Thymus (g)	Thyr. (mg)	Pitui. (mg)	Adrenal (mg)	Testis (g)	Prost. (g)	Semi.v. (g)	Epidid. (g)
0 <sup>a)</sup>	001	312	1.90	8.66	2.43	0.61	1.16	1.41	0.66	26.7	10.1	48.8	2.62	0.40	1.51	0.73
	002	308	1.76	9.45	2.15	0.61	1.08	1.24	0.61	30.5	9.5	47.1	2.46	0.51	1.51	0.72
	003	315	1.89	9.00	2.28	0.59	1.11	1.22	0.57	28.4	8.9	58.1	2.56	0.53	1.37	0.72
	004	313	1.73	8.59	2.24	0.57	1.10	1.36	0.58	20.9	10.6	52.6	2.60	0.35	1.30	0.74
	005	331	1.89	9.43	2.58	0.69	1.09	1.35	0.53	19.9	10.7	60.1	2.85	0.49	1.76	0.63
	307	1.93	8.48	2.32	0.51	1.11	1.32	0.45	26.7	12.3	54.1	2.83	0.48	1.31	0.76	
	Mean	314	1.85	8.94	2.33	0.60	1.11	1.32	0.57	25.5	10.4	53.5	2.65	0.46	1.46	0.72
5	007	287	1.94	7.88	2.49	0.48	1.02	1.22	0.48	18.7	8.8	51.3	2.68	0.40	1.26	0.67
	008	296	1.91	7.60	2.49	0.48	0.97	1.29	0.58	16.1	9.5	49.5	2.63	0.37	1.32	0.65
	009	362	2.03	9.72	2.59	0.73	1.29	1.34	0.61	18.1	12.3	53.1	2.45	0.47	1.40	0.71
	010	329	1.97	9.45	2.62	0.57	1.18	1.26	0.85	19.1	10.1	45.6	2.75	0.54	1.61	0.67
	011	341	1.85	10.76	2.73	0.62	1.05	1.31	0.86	22.9	10.8	63.6	2.83	0.37	1.30	0.67
	012	295	1.82	8.41	2.45	0.49	1.09	1.25	0.61	21.0	8.7	42.8	2.49	0.43	1.10	0.71
	Mean	318	1.92	8.97	2.56	0.56	1.10	1.28	0.67	19.3	10.0	51.0	2.64	0.43	1.33	0.68
10	013	269	1.84	7.05	2.05	0.44	0.89	1.09	0.52	23.8	9.1	54.0	2.60	0.43	1.06	0.62
	014	295	1.90	7.92	2.07	0.48	0.98	1.14	0.48	19.2	10.7	54.1	2.57	0.32	1.24	0.71
	015	272	1.92	7.32	2.26	0.58	0.91	1.18	0.51	18.7	8.5	44.5	2.57	0.46	1.09	0.61
	016	310	1.87	8.39	2.62	0.66	1.06	1.37	0.58	20.8	10.5	52.6	2.77	0.44	1.27	0.73
	017	267	2.06	6.81	2.22	0.60	1.00	1.23	0.38	19.2	10.7	59.6	2.92	0.40	1.46	0.67
	018	315	2.05	7.91	2.42	0.59	1.16	1.25	0.52	21.3	11.1	48.7	3.01	0.45	1.38	0.78
	Mean	288	1.94	7.57	2.27	0.56	1.00	1.21	0.52	20.5	10.1	52.3	2.74	0.42	1.25	0.69
0 <sup>b)</sup>	019	300	1.93	7.89	2.28	0.56	1.02	1.16	0.48	20.9	11.1	48.1	2.52	0.55	1.10	0.67
	313	1.93	9.09	2.44	0.70	1.14	1.20	0.58	21.8	10.9	50.9	2.68	0.51	1.54	0.73	
	021	348	2.02	10.95	2.65	0.70	1.25	1.39	0.53	19.0	11.7	54.4	2.96	0.65	1.62	0.70
	022	238	1.79	6.39	2.04	0.40	0.85	1.10	0.36	25.4	8.3	40.3	2.55	0.45	1.07	0.65
	023	285	2.00	7.73	2.26	0.44	0.96	1.26	0.55	25.6	11.3	54.4	2.50	0.34	1.55	0.69
	024	310	1.95	9.03	2.65	0.55	1.13	1.17	0.41	26.5	12.2	58.9	2.66	0.42	1.51	0.83
	Mean	299	1.94	8.51	2.39	0.56	1.06	1.21	0.49	23.2	10.9	51.2	2.65	0.49	1.40	0.71
20	025	252	1.98	5.54	2.07	0.55	1.14	1.07	0.49	21.2	9.8	37.9	2.62	0.32	1.06	0.64
	026	237	1.84	7.18	2.06	0.41	0.81	1.10	0.44	24.7	8.6	44.3	2.62	0.34	1.09	0.62
	027	274	1.79	6.72	2.16	0.52	1.08	1.15	0.47	21.6	9.8	45.3	2.55	0.28	1.19	0.57
	028	308	2.01	7.16	2.22	0.61	1.05	1.20	0.56	23.1	11.1	48.4	2.71	0.33	1.21	0.65
	029	233	1.90	5.70	1.87	0.43	0.86	1.20	0.37	19.0	9.5	47.6	2.72	0.22	0.92	0.65
	030	236	1.87	5.59	2.03	0.46	0.83	1.05	0.49	16.7	8.5	38.9	2.27	0.28	1.04	0.62
	Mean	257	1.90	6.32	2.07	0.50	0.96	1.13	0.47	21.4	9.6	43.7	2.58	0.30	1.09	0.63

a) : Control I ; b) : Control II

5

10

0<sup>a</sup>

20

Appendix 12 Relative organ weights of individual male rats fed dry beef-contained diet in a 28-day dose range-finding study

Conc. in diet(%)	Animal numbers	B.W. (g)	Brain (%)	Liver (%)	Kidney (%)	Spleen (%)	Heart (%)	Lung (%)	Thymus (%)	Thyr. (mg%)	Pitul. (mg%)	Adrenal (mg%)	Testis (%)	Prost. (%)	Semi.v (%)	Epidid. (%)
0 <sup>a</sup>	001	312	0.61	2.78	0.78	0.20	0.37	0.45	0.21	8.6	3.2	15.6	0.84	0.13	0.48	0.23
	002	308	0.57	3.07	0.70	0.20	0.35	0.40	0.20	9.9	3.1	15.3	0.80	0.17	0.49	0.23
	003	315	0.60	2.86	0.72	0.19	0.35	0.39	0.18	9.0	2.8	18.4	0.81	0.17	0.43	0.23
	004	313	0.55	2.74	0.72	0.18	0.35	0.43	0.19	6.7	3.4	16.8	0.83	0.11	0.42	0.24
	005	331	0.57	2.85	0.78	0.21	0.33	0.41	0.16	6.0	3.2	18.2	0.86	0.15	0.53	0.19
	006	307	0.63	2.76	0.76	0.17	0.36	0.43	0.15	8.7	4.0	17.6	0.92	0.16	0.43	0.25
	Mean	314	0.59	2.84	0.74	0.19	0.35	0.42	0.18	8.2	3.3	17.0	0.84	0.15	0.46	0.23
5	007	287	0.68	2.75	0.87	0.17	0.36	0.43	0.17	6.5	3.1	17.9	0.93	0.14	0.44	0.23
	008	296	0.65	2.57	0.84	0.16	0.33	0.44	0.20	5.4	3.2	16.7	0.89	0.13	0.45	0.22
	009	362	0.56	2.69	0.72	0.20	0.36	0.37	0.17	5.0	3.4	14.7	0.68	0.13	0.39	0.20
	010	329	0.60	2.87	0.80	0.17	0.36	0.38	0.26	5.8	3.1	13.9	0.84	0.16	0.49	0.20
	011	341	0.54	3.16	0.80	0.18	0.31	0.38	0.25	6.7	3.2	18.7	0.83	0.11	0.38	0.20
	012	295	0.62	2.85	0.83	0.17	0.37	0.42	0.21	7.1	2.9	14.5	0.84	0.15	0.37	0.24
	Mean	318	0.61	2.82	0.81	0.18	0.35	0.40	0.21	6.1	3.2	16.1	0.84	0.14	0.42	0.22
10	013	269	0.68	2.62	0.76	0.16	0.33	0.41	0.19	8.8	3.4	20.1	0.97	0.16	0.39	0.23
	014	295	0.64	2.68	0.70	0.16	0.33	0.39	0.16	6.5	3.6	18.3	0.87	0.11	0.42	0.24
	015	272	0.71	2.69	0.83	0.21	0.33	0.43	0.19	6.9	3.1	16.4	0.94	0.17	0.40	0.22
	016	310	0.60	2.71	0.85	0.21	0.34	0.44	0.22	6.7	3.4	17.0	0.89	0.14	0.41	0.24
	017	267	0.77	2.55	0.83	0.22	0.37	0.46	0.14	7.2	4.0	22.3	1.09	0.15	0.55	0.25
	018	315	0.65	2.51	0.77	0.19	0.37	0.40	0.17	6.8	3.5	15.5	0.96	0.14	0.44	0.25
	Mean	288	0.68	2.63	0.79	0.19	0.35	0.42	0.18	7.2	3.5	18.3	0.95	0.15	0.44	0.24
0 <sup>b</sup>	019	300	0.64	2.63	0.76	0.19	0.34	0.39	0.16	7.0	3.7	16.0	0.84	0.18	0.37	0.22
	020	313	0.62	2.90	0.78	0.22	0.36	0.38	0.19	7.0	3.5	16.3	0.86	0.16	0.49	0.23
	021	348	0.58	3.15	0.76	0.20	0.36	0.40	0.15	5.5	3.4	15.6	0.85	0.19	0.47	0.20
	022	238	0.75	2.68	0.86	0.17	0.36	0.46	0.15	10.7	3.5	16.9	1.07	0.19	0.45	0.27
	023	285	0.70	2.71	0.79	0.15	0.34	0.44	0.19	9.0	4.0	19.1	0.88	0.12	0.54	0.24
	024	310	0.63	2.91	0.85	0.18	0.36	0.38	0.13	8.5	3.9	19.0	0.86	0.14	0.49	0.27
	Mean	299	0.65	2.83	0.80	0.19	0.35	0.41	0.16	8.0	3.7	17.2	0.89	0.16	0.47	0.24
20	025	252	0.79	2.20	0.82	0.22	0.45	0.42	0.19	8.4	3.9	15.0	1.04	0.13	0.42	0.25
	026	237	0.78	3.03	0.87	0.17	0.34	0.46	0.19	10.4	3.6	18.7	1.11	0.14	0.46	0.26
	027	274	0.65	2.45	0.79	0.19	0.39	0.42	0.17	7.9	3.6	16.5	0.93	0.10	0.43	0.21
	028	308	0.65	2.32	0.72	0.20	0.34	0.39	0.18	7.5	3.6	15.7	0.88	0.11	0.39	0.21
	029	233	0.82	2.45	0.80	0.18	0.37	0.52	0.16	8.2	4.1	20.4	1.17	0.09	0.39	0.28
	030	236	0.79	2.37	0.86	0.19	0.35	0.44	0.21	7.9	3.6	16.5	0.96	0.12	0.44	0.26
	Mean	257	0.75	2.47	0.81	0.19	0.37	0.44	0.18	8.4	3.7	17.1	1.02	0.12	0.42	0.25

a) : Control I ; b) : Control II

Appendix 13 Absolute organ weights of individual female rats fed dry beef-contained diet in a 28-day dose range-finding study

Conc. in diet(%)	Animal numbers	B.W. (g)	Brain (g)	Liver (g)	Kidney (g)	Spleen (g)	Heart (g)	Lung (g)	Thymus (g)	Thyr. (mg)	Pitul. (mg)	Adrenal (mg)	Ovary (mg)	Uterus (g)
0 <sup>a</sup>	501	191	1.82	5.76	1.68	0.40	0.67	0.95	0.40	17.5	14.5	48.1	60.4	0.43
	502	205	1.67	6.16	1.81	0.38	0.74	1.01	0.38	21.6	13.9	63.3	77.1	0.44
	503	201	1.80	6.02	1.93	0.47	0.75	1.04	0.65	22.2	12.2	52.3	64.2	0.36
	504	224	1.75	7.38	1.70	0.56	0.71	0.95	0.55	18.1	15.5	57.7	67.7	0.44
	505	215	1.90	6.13	1.83	0.39	0.87	0.91	0.55	20.7	13.4	62.4	69.9	0.45
	506	187	1.75	5.06	1.54	0.36	0.67	0.93	0.40	22.9	9.1	51.2	64.8	0.68
	Mean	204	1.78	6.09	1.75	0.43	0.74	0.97	0.49	20.5	13.1	55.8	67.4	0.47
5	507	186	1.70	5.06	1.39	0.39	0.64	0.99	0.45	18.4	10.8	40.2	76.3	0.36
	508	221	1.82	6.26	1.90	0.46	0.89	1.06	0.36	17.5	14.5	61.6	96.3	0.48
	509	201	1.76	6.57	1.59	0.52	0.78	1.12	0.47	24.4	12.9	57.4	73.3	0.65
	510	197	1.78	5.34	1.65	0.41	0.70	0.95	0.54	20.6	11.3	47.2	55.6	0.28
	511	228	1.88	7.50	1.83	0.55	0.87	1.05	0.49	17.0	14.7	62.9	82.0	0.50
	512	213	1.87	6.25	1.63	0.36	0.75	0.98	0.42	25.2	15.6	45.5	59.5	0.61
	Mean	208	1.80	6.16	1.67	0.45	0.77	1.03	0.46	20.5	13.3	52.5	73.8	0.48
10	513	181	1.77	4.62	1.47	0.46	0.68	0.92	0.40	19.5	11.7	50.2	61.1	0.35
	514	179	1.91	5.01	1.53	0.33	0.68	0.92	0.42	21.5	12.1	54.1	77.7	0.44
	515	201	1.89	5.62	1.64	0.48	0.75	1.03	0.45	21.8	14.9	57.9	100.5	0.57
	516	204	1.76	5.23	1.61	0.42	0.72	0.98	0.48	21.0	13.5	48.2	70.3	0.33
	517	204	1.77	5.74	1.63	0.42	0.67	1.03	0.40	17.9	12.3	65.6	77.4	0.50
	518	219	1.85	6.17	2.01	0.49	0.73	1.02	0.54	21.9	14.5	65.6	72.8	0.57
	Mean	198	1.83	5.40	1.65	0.43	0.71	0.98	0.45	20.6	13.2	56.9	76.6	0.46
0 <sup>b</sup>	519	198	1.77	5.50	1.60	0.42	0.73	0.96	0.57	21.1	10.7	52.5	69.7	0.40
	520	234	1.89	7.24	2.10	0.46	0.74	1.04	0.62	20.7	17.8	67.7	86.7	0.46
	521	190	1.76	5.17	1.52	0.41	0.66	0.86	0.47	25.5	10.9	59.4	65.9	0.36
	522	223	1.84	6.46	1.78	0.48	0.80	1.02	0.58	22.1	12.6	75.7	71.7	0.81
	523	221	1.86	6.93	1.76	0.35	0.88	1.14	0.50	19.6	15.2	63.4	71.2	0.46
	524	224	1.88	6.54	1.69	0.37	0.73	0.99	0.40	19.6	14.0	56.3	78.1	0.73
	Mean	215	1.83	6.31	1.74	0.42	0.76	1.00	0.52	21.4	13.5	62.5	73.9	0.54
20	525	218	1.80	6.25	1.70	0.38	0.90	0.95	0.46	22.6	15.4	55.6	82.5	0.35
	526	209	1.86	5.07	1.51	0.36	0.73	0.99	0.58	22.3	11.7	44.5	61.2	0.37
	527	191	1.78	4.82	1.67	0.35	0.67	0.92	0.44	19.8	11.6	49.6	68.8	0.36
	528	201	1.82	5.68	1.71	0.41	0.73	1.07	0.63	18.3	13.1	67.7	70.1	0.43
	529	172	1.78	4.40	1.46	0.35	0.65	0.88	0.38	17.7	11.1	46.9	54.1	0.54
	530	226	1.79	6.10	1.71	0.72	0.81	1.15	0.44	19.8	14.7	58.3	77.5	0.66
	Mean	203	1.81	5.39	1.63	0.43	0.75	0.99	0.49	20.1	12.9	53.8	69.0	0.45

a) : Control I ; b) : Control II

Conc. in diet(%)	Animal numbers	B.W. (g)	Brain (%)	Liver (%)	Kidney (%)	Spleen (%)	Heart (%)	Lung (%)	Thymus (%)	Thyr. (mg%)	Pitui. (mg%)	Adrenal (mg%)	Ovary (mg%)	Uterus (%)
0 <sup>a</sup>	501	191	0.95	3.02	0.88	0.21	0.35	0.50	0.21	9.2	7.6	25.2	31.6	0.23
	502	205	0.81	3.00	0.88	0.19	0.36	0.49	0.19	10.5	6.8	30.9	37.6	0.21
	503	201	0.90	3.00	0.96	0.23	0.37	0.52	0.32	11.0	6.1	26.0	31.9	0.18
	504	224	0.78	3.29	0.76	0.25	0.32	0.42	0.25	8.1	6.9	25.8	30.2	0.20
	505	215	0.88	2.85	0.85	0.18	0.40	0.42	0.26	9.6	6.2	29.0	32.5	0.21
	506	187	0.94	2.71	0.82	0.19	0.36	0.50	0.21	12.2	4.9	27.4	34.7	0.36
	Mean	204	0.88	2.98	0.86	0.21	0.36	0.48	0.24	10.1	6.4	27.4	33.1	0.23
5	507	186	0.91	2.72	0.75	0.21	0.34	0.53	0.24	9.9	5.8	21.6	41.0	0.19
	508	221	0.82	2.83	0.86	0.21	0.40	0.48	0.16	7.9	6.6	27.9	43.6	0.22
	509	201	0.88	3.27	0.79	0.26	0.39	0.56	0.23	12.1	6.4	28.6	36.5	0.32
	510	197	0.90	2.71	0.84	0.21	0.36	0.48	0.27	10.5	5.7	24.0	28.2	0.14
	511	228	0.82	3.29	0.80	0.24	0.38	0.46	0.21	7.5	6.4	27.6	36.0	0.22
	512	213	0.88	2.93	0.77	0.17	0.35	0.46	0.20	11.8	7.3	21.4	27.9	0.29
	Mean	208	0.87	2.96	0.80	0.22	0.37	0.50	0.22	10.0	6.4	25.2	35.5	0.23
10	513	181	0.98	2.55	0.81	0.25	0.38	0.51	0.22	10.8	6.5	27.7	33.8	0.19
	514	179	1.07	2.80	0.85	0.18	0.38	0.51	0.23	12.0	6.8	30.2	43.4	0.25
	515	201	0.94	2.80	0.82	0.24	0.37	0.51	0.23	10.8	7.4	28.8	50.0	0.28
	516	204	0.86	2.56	0.79	0.21	0.35	0.48	0.24	10.3	6.6	23.6	34.5	0.16
	517	204	0.87	2.81	0.80	0.21	0.33	0.50	0.20	8.8	6.0	32.2	37.9	0.25
	518	219	0.84	2.82	0.92	0.22	0.33	0.47	0.25	10.0	6.6	30.0	33.2	0.26
	Mean	198	0.93	2.72	0.83	0.22	0.36	0.50	0.23	10.5	6.7	28.8	38.8	0.23
0 <sup>b</sup>	519	198	0.89	2.78	0.81	0.21	0.37	0.48	0.29	10.7	5.4	26.5	35.2	0.20
	520	234	0.81	3.09	0.90	0.20	0.32	0.44	0.26	8.8	7.6	28.9	37.1	0.20
	521	190	0.93	2.72	0.80	0.22	0.35	0.45	0.25	13.4	5.7	31.3	34.7	0.19
	522	223	0.83	2.90	0.80	0.22	0.36	0.46	0.26	9.9	5.7	33.9	32.2	0.36
	523	221	0.84	3.14	0.80	0.16	0.40	0.52	0.23	8.9	6.9	28.7	32.2	0.21
	524	224	0.84	2.92	0.75	0.17	0.33	0.44	0.18	8.8	6.3	25.1	34.9	0.33
	Mean	215	0.86	2.93	0.81	0.20	0.36	0.47	0.25	10.1	6.3	29.1	34.4	0.25
20	525	218	0.83	2.87	0.78	0.17	0.41	0.44	0.21	10.4	7.1	25.5	37.8	0.16
	526	209	0.89	2.43	0.72	0.17	0.35	0.47	0.28	10.7	5.6	21.3	29.3	0.18
	527	191	0.93	2.52	0.87	0.18	0.35	0.48	0.23	10.4	6.1	26.0	36.0	0.19
	528	201	0.91	2.83	0.85	0.20	0.36	0.53	0.31	9.1	6.5	33.7	34.9	0.21
	529	172	1.03	2.56	0.85	0.20	0.38	0.51	0.22	10.3	6.5	27.3	31.5	0.31
	530	226	0.79	2.70	0.76	0.32	0.36	0.51	0.19	8.8	6.5	25.8	34.3	0.29
	Mean	203	0.90	2.65	0.81	0.21	0.37	0.49	0.24	10.0	6.4	26.6	34.0	0.22

a) : Control I ; b) : Control II