**Table H-4: Animal Health Measures for Evaluating Livestock, Including Animal Clones - Reproductive** (for males and non-dairy females, during first breeding cycle; early in lactation for dairy animals)

| Measurement | Comments |
|---|---|
| **Comprehensive Breeding Soundness Examination (Males)**<br>-Comprehensive physical examination with special attention to<br>-eyes,<br>-feet/legs<br>-prepuce<br>-penis<br>-palpation of testes and epididymides<br>-Scrotal circumference<br>-Rectal Examination, including<br>-hernia,<br>-spinal lesions,<br>-internal abscesses,<br>-accessory sex glands<br>-Semen analysis (motility and morphology)<br>-Libido | per established guidance on a species-specific basis<br><br>For seasonal breeders, exam should be performed during breeding season. |
| **Comprehensive Reproductive Exam (Females)**<br>- Age of puberty onset (behavioral and/or physiological measures)<br>-Comprehensive physical examination<br>- Physical exam of genitalia<br>-External<br>- Internal<br>-Rectal palpation, vaginal speculum,<br>-Ultrasound if indicated by clinical findings<br>-Record review for<br>-calving assistance<br>- abortion incidence<br>- calving interval<br>- retained placenta<br>- metritis<br>- mastitis<br>- maternal behavioral traits<br>- colostrum quality using colostrometer | Concomitant IgG measure in calf for measure of colostrum quality in beef calves, kids, and lambs. First parity dairy animals may not produce adequate quality colostrum. Comparisons should thus be made for appropriate parity level. |

| **Table H-5: Animal Health Measures for Evaluating Livestock, Including Animal Clones - Maturity, Aging, Lifespan** (immediately before animal use (e.g., slaughter)) | |
|---|---|
| **Measurement** | **Comments** |
| **Comprehensive Mature Animal Examination**<br>*Generalized*<br>- Demeanor<br>- Posture/Gait<br>- Respiratory rate<br>- Vocalization<br>- Appetite/Feed consumption<br>- Urination/Defecation<br>- Body condition<br>- Body conformation<br>- Skin/coat<br><br>*System Specific*<br>- Special Senses (ear, eyes, nose, throat)<br>- Integumentary<br>- Musculoskeletal<br>- Cardiovascular<br>- Respiratory<br>- Oropharyngeal<br>- Gastrointestinal<br>- Genitourinary<br>- Neurological<br>- Peripheral lymph nodes | Health records kept on all breeding animals, and on all primary animal clones. They include all veterinary diagnoses, therapies, and vital statistics such as birth weight, weaning weight, physical exam findings, etc. |
| Growth Performance/<br>Weight gain | |
| Signs and Symptoms Observed in Animal Clones<br>-Arthritis<br>-Diabetes<br>-Nervousness<br>-Seizures<br>-Neoplasms<br>-Other unspecified signs of early aging | |

| **Table H-6: Animal Health Measures for Evaluating Livestock, Including Animal Clones - Clinical Measurements** | |
|---|---|
| **Measurement** | **Comments** |
| Biochemistry | |
| Albumin | |
| Alkaline Phosphatase | |
| Amylase | |
| ALT (SGPT) | |
| AST (SGOT) | |
| Bile acids | |
| BUN | |
| CIAP (calf intestinal alkaline phosphatase) | for bovine species |
| Creatine phosphokinase | |
| Gamma glutamyl transferase | |
| Lipase | |
| Sorbitol Dehydrogenase | |
| Cholesterol | |
| Creatinine | |
| Glucose | |
| Serum Protein | |
| Calcium | |
| Chloride | |
| Potassium | |
| Sodium | |
| **Hemo/Leukograms (CBC)** | |
| Red Blood Cell count | |
| WBC count including Differential | |
| Platelet count | |
| **Urinalysis** | |
| Specific gravity | |
| Glucose | |
| Ketones | |
| Bilirubin | |
| pH | |
| Cells | |
| Protein | |
| Bacteria | |
| Blood (including leukocytes) | |
| Nitrate | |

The following table describes the nature of the laboratory tests that have been performed during a CVE, and what they measure. Some common abbreviations, expanded explanations of the functional descriptions, and how the tests are used in differential diagnosis were added during the review of the submitted data as part of the risk assessment.

**Table H-7: Standard Large Animal Panel (Blood Biochemistry) Often Performed During a CVE**

| Test | Origin | Functional Description |
|---|---|---|
| Sodium ($Na^+$) | Diet | Principle cation of extracellular fluid (ECF or plasma). Maintains osmotic pressure of ECF. Cannot evaluate the electrolytes ($Na^+$, $K^+$, $Cl^-$, $HCO_3$) by themselves. They are interdependent. Their regulation depends on hydration status, disease, aldosterone, renin-angiotensin, acid/base status, etc. Low $Na^+$ may indicate - diarrhea, vomiting, congestive heart failure, renal disease, ruptured bladder. Elevations may indicate - dehydration, vomiting and diarrhea, inadequate intake, renal failure, increased salt intake, artifact from improper sample handling. |
| Potassium ($K^+$) | Diet | Principle cation of intracellular fluid (ICF). Maintains osmotic pressure within the cell (osmotic balance). Elevations effect cardiac function. Plasma levels may be altered by diarrhea, renal failure, metabolic or respiratory acidosis (causes elevated $K^+$, a.k.a. hyperkalemia), anorexia, hypoadrenocorticism (Addison's disease), ruptured bladder, artifact from hemolysis of sample. |
| Chloride ($Cl^-$) | Diet | Major plasma (ECF) anion. Used to calculate the anion gap. Also affected by acid/base status. Reductions seen with chronic vomiting. |
| Bicarbonate ($HCO_3^-$) | Metabolism | Indicative of the $CO_2$ concentration in blood, buffers blood from radical pH changes. Used to diagnose metabolic or respiratory acidosis or alkalosis. |
| Anion Gap | Calculated | Calculated value to represent the unmeasured anions in the blood. High anion gap may indicate ketoacidosis, lactic acidosis, renal failure (uremic acidosis) and ethylene glycol toxicosis (organic acidosis). Low anion gap is RARE. It may indicate low plasma albumin, or high calcium |
| Blood Urea Nitrogen (BUN) | Liver | Urea is produced by liver and excreted by kidneys. High values may be pre-renal (dehydration), renal (disease of kidney), or post renal (disease of ureter, bladder or urethra). Low values may indicate chronic liver failure (lack of production) or dietary protein deficiency. |
| Creatinine | Muscle | Product of creatine metabolism by muscle tissue and excreted by kidneys. Used as an important measurement of kidney function. Resting level directly related to muscle mass. Higher in non-castrated males than females. |
| Calcium ($Ca^{++}$) | Diet, bone | Regulated by parathyroid hormone and calcitonin (from the thyroid). Vitamin D synthesized in liver important in dietary absorption. Acid base status and albumin level can affect blood levels. Co-factor for many enzymes. Key role in bone |

**Table H-7: Standard Large Animal Panel (Blood Biochemistry) Often Performed During a CVE**

| Test | Origin | Functional Description |
|---|---|---|
| | | development, blood coagulation, cell growth, neuro-muscular transmission. Intestinal absorption may be affected by diarrhea or vitamin D deficiency. |
| Phosphorus (P) | Diet, bone | Similar to $Ca^{++}$ Indicative of parathyroid and thyroid gland function, renal function. Important as a buffer for the blood. Blood level primarily regulated by the kidneys. Abnormalities related to dietary deficiency, renal excretion and hormonal imbalances that would also affect $Ca^{++}$. |
| Magnesium ($Mg^{++}$) | Diet | Required for normal muscle and nervous tissue function. Co-factor for many enzymes, especially kinases and phosphatases. Influences the regulation of serum calcium. Mostly clinical relevance in a deficiency known as "Grass Tetany" usually from acutely feeding the cattle lush rye pasture which is notorious for $Mg^{++}$ deficiency. |
| Total Protein (TP) | Liver, Immune System | Consists mostly of proteins produced by liver (albumin, carrier proteins) and immunoglobulins. Used as indicator of total plasma volume. |
| Albumin (alb) | Liver | Regulates plasma osmolarity. Binds certain molecules (some drugs, $Ca^{++}$). Deficiency can be increased loss or decreased production. Loss may come from malfunctioning kidneys, intestine, or leakage into a body cavity. Decreased production may come from chronic liver failure. |
| Globulin (glob) | alpha-, beta-liver; gamma-B lymphocytes | Sum of globulins produced by the liver (transport proteins, like haptoglobin) and immunoglobulins (passive acquired from colostrum or endogenous production from B lymphocytes that have matured into plasma cells). |
| Albumin/Globulin Ratio (A/G) | Calculated | Used to determine if there is an overproduction of gamma globulin which may occur in autoimmune disease. Low values may be due to insufficient albumin (see albumin for discussion) |
| Glucose | Digestion, liver glycogen, synthesis | Indicative of the energy state of the animal. Can be reduced (hypoglycemia) in anorexia or due to artifact (sample handling), increased in diabetes mellitus (rare in cattle) or stress (common in cattle) |
| Alanine Aminotransferase (AST) | Liver, muscle | Present in liver and released if liver is damaged. May also indicate skeletal and cardiac muscle damage. |
| Sorbitol Dehydrogenase (SDH) | Liver | Present in cytosol of liver cells. High serum levels may indicate liver damage. |
| Alkaline Phosphatase (Alk Phos) | Organ Membranes | Present in hepatocytes, biliary epithelium, osteoblasts, placenta, intestine, and kidney. May be high in young animals due to bone growth. Also an indicator of cholestasis (impaired bile flow). |
| Gamma glutamyltransferase (GGT) | Organ Membranes | Present in hepatocytes, biliary epithelium, and kidney. Used to detect cholestasis. Has no involvement with the skeletal system to differentiate it from alkaline phosphatase. It is a better indicator of biliary stasis in large animals. |
| Total Bilirubin (T bili) | Hemoglobin Degradation | Increase in bilirubin can result in icterus (jaundice). Used as a measure of liver maturity and function. |
| Indirect Bilirubin | Hemoglobin | Bilirubin not conjugated to various carbohydrates for transport |

**Table H-7: Standard Large Animal Panel (Blood Biochemistry) Often Performed During a CVE**

| Test | Origin | Functional Description |
|---|---|---|
| | Degradation (Non-Conjugated) | into bile in to the liver (elevations are from pre-hepatic sources). Value may be elevated by hemolysis or internal hemorrhage. Used to assess hepatobiliary function. |
| Direct Bilirubin | Hemoglobin Degradation (Conjugated) | Bilirubin conjugated to various carbohydrates for transport to allow for inclusion into micelles in bile for transport from the liver (elevated in post-hepatic obstruction). Elevated with biliary outflow obstruction. Used to assess hepatobiliary function. |
| Amylase | Pancreas | Used by GI system to aid in digestion of starch and sugars. Elevations indicate pancreatic inflammation. Not important in ruminant species. |
| Cholesterol | Liver Synthesis, diet | Precursor for synthesis of steroid hormones, bile acids, and vitamin D. Constituent of cell membranes and bile micelles. Variations may be secondary to endocrine, hepatic, or renal disease. |
| Creatinine Phosphokinase (CK or CPK) | Muscle (skeletal and cardiac), Brain | Intracellular enzyme in skeletal and cardiac muscle. Used to detect damage to muscle. |
| Iron ($Fe^{++}$) | Diet | Ferric Iron associated with transferrin. Iron deficiency is often suspected as the cause of anemia. |
| TIBC (Total Iron Binding Capacity) | Transferrin production by Liver | Used as measurement of the total amount of transferrin. |
| Random Bile Acids (hBA) | Liver | Produced by liver and secreted into bile. Elevations indicate reduced liver function and not necessarily inflammation or biliary stasis. |
| Lipemia - Index | Lipids in plasma | Measure of the level of lipids in the circulation. Can be caused by diets high in fats and influenced by postprandial (after eating) sampling. |
| Hemolysis - Index | Lysis of red blood cells | Caused by lysis of red blood cells which results in release of hemoglobin into the plasma. Also used as an indicator of sample quality. |
| Icterus - Index | Bilirubin in plasma | Index measured by the color of plasma to indicate the amount of bilirubin. It is qualitatively measured by comparing to standard colors. It varies with labs, species, liver disease, dietary intake of carotene in cattle, among other things. |
| Insulin Like Growth Factor I (IGF-I) | Liver | Synthesized by the liver in response to growth hormone. Used as an indicator of the amount of growth hormone being produced. Elevations can be related to increased nutritional status, low values to negative energy balance. Higher in growing animals. |
| Estradiol ($E_2$) | Ovary | Synthesis is controlled by gonadotropins. Synthesis rates related to ovarian function in females. Used to monitor follicular and luteal activity. |
| Cortisol | Adrenal Cortex | Synthesis is regulated by the hypothalamus and pituitary. Involved in normal metabolism. Elevated levels are associated with stress. |

**Table H-7: Standard Large Animal Panel (Blood Biochemistry) Often Performed During a CVE**

| Test | Origin | Functional Description |
|---|---|---|
| Triiodothyronine (T3) | Thyroid Gland | Synthesis is regulated by the hypothalamus and pituitary. Involved in normal metabolism. |
| **Complete Blood Count (Hemogram)** | | **Description** |
| Hematocrit (Hct) | | Refers to the percent of blood that is occupied by red blood cells. Low values are good indicators of anemia. |
| Hemoglobin (Hb) | | Protein used by red blood cells to distribute oxygen to other tissues and cells in the body. Low values are good indicators of anemia. |
| Red Blood Cells (RBC) | | The absolute concentration of red blood cells in the blood. A low red blood cell count is defined as anemia. High count is polycythemia. |
| Mean Corpuscular Volume (MCV) | | The actual volume of the red blood cells. Larger red blood cells may indicate anemia due to $B_{12}$ or folic acid deficiency, also may caused by increase in reticulocytes; smaller red blood cells may indicate anemia due to iron deficiency. |
| Mean Corpuscular Hemoglobin (MCH) | | This test measures the amount of hemoglobin in red blood cells. Both hemoglobin and hematocrit are used to calculate this number. Low levels indicate anemia. Of limited diagnostic value. |
| Mean Corpuscular Hemoglobin Concentration (MCHC) | | This test measures the amount of hemoglobin in red blood cells. Both hemoglobin and hematocrit are used to calculate this number. Low levels indicate anemia. |
| Red Cell Distribution Width(RDW) | | RDW evaluates the range of sizes of RBCs in a blood sample. If anemia is suspected, based on other blood counts, RDW test results are often used together with MCV results to determine the cause of anemia. |
| White Blood Cells (WBC) | | Leukocytes (WBCs) are produced by the immune system (in bone marrow) to help defend against infection. A high WBC count likely indicates an infection, whereas a low number might be an acute response where readily available cells are summoned to the site of infection or due to immunosuppression. |
| Segmented Neutrophils (segs) | | Phagocytic cells present to guard against infection, particularly bacterial. Segmented neutrophils are mature neutrophils, and are the predominant white cell in non-ruminant mammals. |
| Banded Neutrophils (bands) | | Immature neutrophils. Elevated levels occur in response to a recent infection. |
| Lymphocytes (lymphs) | | T-cells, B-cells, and natural killer (NK) cells. Viral infections can either increase or decrease the total percentage of lymphocytes. It is the predominant white cell in ruminants. |
| Monocytes (monos) | | Monocytes are a type of phagocyte that mature into macrophages. A low number can indicate a higher risk of bacterial infection. |
| Eosinophils (eos) | | Active in killing parasites, can inhibit mast cells or release mediators of inflammation. A high number of eosinophils can indicate allergies or parasitic infections. |
| Basophils (basos) | | Function unclear. A type of phagocyte that produces the anti-inflammatory protein histamine. |
| Platelets (Thrombocytes) | | Tiny cells produced by the bone marrow to help blood clot |

**Table H-7: Standard Large Animal Panel (Blood Biochemistry) Often Performed During a CVE**

| Test | Origin | Functional Description |
|---|---|---|
| | | formation. High number might indicate a blood disease. A decreased platelet count is called thrombocytopenia. Used to measure immune system function. |
| Mean Platelet Volume (MPV) | | Measures the average volume of platelets. May be artifactually high due to clumping of platelets in blood sample. |
| Total Protein-refractometer (TP-ref) | | The total amount of protein in the plasma measured by a refractometer. |
| RBC Morphology | | General morphology (shape) of red blood cells. Poikilocytes - RBCs of irregular shape. Schizocytes - poikilocytes from fragmentation due to flowing through damaged small vessels. |
| Parasites | | The blood sample is examined for the presence of parasites. |
| **Complete Blood Count (Hemogram)** | | **Description** |
| WBC Exam | | Morphological appearance of the white blood cells. |
| Plasma Appearance | | General appearance of the plasma. |

# Appendix I:

# Investigation on the Attributes of Cloned Bovine Products

# 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.

# English language translation of the first three pages of the report "Investigation on the Attributes of Cloned Bovine Products"

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

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# English language summary of the report "Investigation on the Attributes of Cloned Bovine Products"

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.

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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± standard deviation) |
|---|---|---|---|
| Milk | Ordinary cattle | 5 | 83.0±2.6 |
| | BNT cloned cattle | 5 | 82.7±2.0 |
| | SCNT cloned cattle | 5 | 81.3±3.4 |
| Meat | Ordinary cattle | 5 | 83.8±6.6 |
| | BNT cloned cattle | 5 | 82.3±4.7 |
| | SCNT cloned cattle | 5 | 84.9±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±SD) |
|---|---|---|---|---|
| Milk | Ordinary cattle | Control group<br>Test group | 7<br>10 | 7.0±3.7<br>18.0±2.9 |
| | BNT cloned cattle | Control group<br>Test group | 7<br>10 | 4.7±3.2<br>18.0±3.9 |
| | SCNT cloned cattle | Control group<br>Test group | 7<br>10 | 4.9±4.6<br>17.9±4.2 |
| Meat | Ordinary cattle | Control group<br>Test group | 7<br>10 | 5.3±5.0<br>13.0±5.9 |
| | BNT cloned cattle | Control group<br>Test group | 7<br>10 | 7.0±4.9<br>12.5±3.5 |
| | SCNT cloned cattle | Control group<br>Test group | 7<br>10 | 5.7±4.2<br>13.1±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±standard deviation)

(g)

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

(g)

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

Table 1 Analyzed nutrient composition of the milk powder

| Macronutrient | (%) | Vitamin | (mg/100g) | Mineral | (mg/100g) |
|---|---|---|---|---|---|
| Crude protein | 23.3 | A | 113IU/100g | Ca | 1410 |
| Crude fat | 23.4 | $B_1$ | 0.27 | P | 723 |
| Carbohydrate | 45.0 | $B_2$ | 1.11 | K | 2010 |
| Crude fiber | 0.0 | $B_6$ | 0.17 | Na | 195 |
| Ash | 5.4 | $B_{12}$ | 0.0017 | Mg | 79.2 |
| Water | 2.9 | $D_3$ | ND | Fe | 0.326 |
| | | E | 0.4 | Zn | 3.069 |
| | | $K_1$ | ND | Cu | 0.064 |
| | | $K_2$ | 0.0070 | S | 220 |
| | | Niacin | 0.86 | Mn | 0.073 |
| | | Pantotheinic acid | 2.90 | I | 0.07 |
| | | Folic acid | 0.05 | Se | 0.023 |
| | | Biotin | 0.00919 | Mo | ND |
| | | Choline | 0.10 (%) | | |

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

(g/kg diets)

| Ingredient | Basal diet | 5% diet | 10% diet | 20% diet |
|---|---|---|---|---|
| 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-Butylhydroqinone | 0.014 | 0.014 | 0.014 | 0.014 |
| Calollc 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

(g/kg Mix)

| Mineral Mix | | | | | | Vitamin Mix | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Ingredients | Contents (%) | Basal diet | 5% diet | 10% diet | 20% diet | Ingredients | Basal diet | 5% diet | 10% diet | 20% diet |
| *ESSENTIAL MINERALS* | | | | | | Vitamine A Palmitate (500,000IU/g) | 0.800 | 0.687 | 0.574 | 0.348 |
| Calcium Carbonate | Ca : 40.04 | 357.00 | 306.663 | 256.326 | 155.652 | | | | | |
| Potassium Phosphate (monobasic) | P : 22.76<br>K : 28.73 | 196.00 | 161.722 | 127.570 | 59.390 | Thiamine HCl ($B_1$) | 0.800 | 0.590 | 0.570 | 0.550 |
| Potassium Citrate $H_2O$ | K : 36.18 | 124.150 * | 93.211 | 62.174 | | Riboflavin ($B_2$) | 0.800 | 0.540 | 0.490 | 0.380 |
| Sodium Chloride | Na : 39.34 | 74.00 | 66.822 | 59.570 | 45.140 | Pyridoxine HCl ($B_6$) | 0.700 | 0.690 | 0.680 | 0.670 |
| Potassium Sulfate | S : 18.39<br>K : 44.87 | 68.35 * | 51.263 | 34.175 | | Vitamine $B_{12}$ (0.1%) | 2.500 | 2.400 | 2.300 | 2.200 |
| Magnesium Oxide | Mg : 60.32 | 24.00 | 22.118 | 20.282 | 16.565 | | | | | |
| Ferric Citrate | Fe : 16.50 | 6.06 | 6.06 | 6.06 | 5.887 | Vitamine $D_3$ (400,000IU/g) | 0.250 | 0.250 | 0.250 | 0.250 |
| Zinc Carbonate | Zn : 52.14 | 1.65 | 1.54 | 1.485 | 1.32 | | | | | |
| Manganous Carbonate | Mn : 47.79 | 0.63 | 0.630 | 0.630 | 0.624 | | | | | |
| Cupric Carbonate | Cu : 57.47 | 0.30 | 0.30 | 0.295 | 0.295 | Vitamine E Acetate (500IU/g) | 15.000 | 15.000 | 15.000 | 15.000 |
| Potassium Iodate | I : 59.30 | 0.01 | 0.009 | 0.007 | 0.003 | | | | | |
| Sodium Selenate | Se : 41.79 | 0.01025 | 0.00957 | 0.00888 | 0.00752 | Vitamine $K_3$ | 0.075 | 0.075 | 0.074 | 0.074 |
| Ammonium Paramolybdate $4H_2O$ | Mo : 54.34 | 0.00795 | 0.00795 | 0.00795 | 0.00795 | | | | | |
| | | | | | | Niacin | 3.000 | 3.000 | 3.000 | 3.000 |
| *NON-ESSENTIAL MINERALS* | | | | | | Calcium Pantothenate | 1.600 | 1.500 | 1.300 | 1.000 |
| Sodium Metasilicate $9H_2O$ | Si : 9.88 | 1.45 | 1.45 | 1.45 | 1.45 | | | | | |
| Chromium Potassium Sulfate $12H_2O$ | Cr : 10.42 | 0.275 | 0.275 | 0.275 | 0.275 | Folic Acid | 0.200 | 0.200 | 0.200 | 0.190 |
| | | | | | | Biotin | 0.020 | 0.020 | 0.019 | 0.018 |
| 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 Flouride | 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 | Sucrose finely powdered | 74.655 | 975.048 | 975.543 | 976.320 |

* : Compotition is differ from that of the AIN standared diet.
The mineral mix and vitamin mix for each compotition was designed to reflect the mineral (essential miterals) 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

(g)

| Conc. in diet | Number of animals | Day 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

(g)

| Conc. in diet | Number of animals | Day 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

(g)

| Conc. in diet | Number of animals | 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

(g)

| Conc. in diet | Number of animals | 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 | Cloudy | | pH | | | | | | | Protein | | | | | Glucose | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PY | − | + | 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), ±(15～30mg/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 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 | Cloudy | | pH | | | | | | | Protein | | | | | Glucose | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PY | − | + | 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 ($10^4$/μL) | Hb (g/dL) | Ht (%) | MCV (fL) | MCH (pg) | MCHC (%) | WBC ($10^2$/μL) | Plat. ($10^4$/μL) | PT (sec) | APTT (sec) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0% | 6 | 752 ± 17 | 14.9 ± 0.5 | 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 ($10^4$/μL) | Hb (g/dL) | Ht (%) | MCV (fL) | MCH (pg) | MCHC (%) | PT (sec) | APTT (sec) | WBC ($10^2$/μL) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0% | 6 | 758 ± 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 | 13.0 ± 0.7 | 17.5 ± 1.0 | 33 ± 13 |

| Conc. in diet | No. of animals | Differential leukocyte counts (%) | | | | | | | Plat. ($10^4$/μL) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Neutro. | | | | | |
| | | Baso. | Eosin. | Stab. | Seg. | Lymph. | Mono. | Other | |
| 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) | γ-GTP (IU/L) | ChE (IU/L) | CK (IU/L) | T.P. (g/dL) | Alb (%) | $\alpha_1$-G (%) | $\alpha_2$-G (%) | $\alpha_3$-G (%) | β-G (%) | γ-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 | 49.3 ± 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 | 1.03 ± 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-Cho. (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 | 0.85 ± 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 | 0.83 ± 0.16 | 0.50 ± 0.05 | 0.30 ± 0.03 | 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 s 28day dose range-finding test

| Conc. in diet | No. of animals | 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 (%) | $\alpha_1$-G (%) | $\alpha_2$-G (%) | $\alpha_3$-G (%) | β-G (%) | γ-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 | 3.0 ± 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 | 86 ± 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 ± 0.05 |

| Conc. in diet | No. of animals | T-Cho. (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 | 4.53 ± 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 ± 0.23 | 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 a) | 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 a) | 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[a)] | 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

(g)

| Conc. in diet | Number of animals | Day 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

(g)

| Conc. in diet | Number of animals | Day 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-containd diet in a 28day dose range-finding test

(g/day/rat)

| Conc. in diet | Cage number | 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-containd diet in a 28day dose range-finding test

(g/day/rat)

| Conc. in diet | Cage number | 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 | − | 6.5 | − | − | − | − | 0.1 | − |
| 20% | 519 | PY | − | 7.0 | − | − | − | − | 0.1 | − |
| | 520 | PY | − | 7.0 | − | − | − | − | 0.1 | − |
| | 521 | PY | − | 6.5 | − | − | − | − | 0.1 | − |
| | 522 | PY | − | 6.5 | − | − | − | − | 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 ($10^4$/μL) | Hb (g/dL) | Ht (%) | MCV (fL) | MCH (pg) | MCHC (%) | WBC ($10^2$/μL) | Plat. ($10^4$/μL) | PT (sec) | APTT (sec) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0% | 001 | 770 | 14.8 | 42.2 | 55 | 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 | 58 | 149 | 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 | 789 | 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 | 116 | 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 | 55 | 19.6 | 35.6 | 52 | 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 ($10^4$/μL) | Hb (g/dL) | Ht (%) | MCV (fL) | MCH (pg) | MCHC (%) | PT (sec) | APTT (sec) | WBC ($10^2$/μL) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0% | 501 | 769 | 14.9 | 41.8 | 54 | 19.4 | 35.6 | 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 | 15.1 | 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 | 756 | 15.3 | 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 | 57 |
| | 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. ($10^4$/μL) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Neutro. | | | | | |
| | | Baso. | Eosin. | Stab. | 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 (%) | $\alpha_1$-G (%) | $\alpha_2$-G (%) | $\alpha_3$-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 | 13.3 | 4.7 | 1.01 |
| | 004 | 275 | 71 | 26 | 830 | 0.77 | 55 | 162 | 6.11 | 48.2 | 20.6 | 6.2 | 5.7 | 15.9 | 3.4 | 0.93 |
| | 005 | 241 | 73 | 30 | 482 | 0.35 | 53 | 160 | 5.80 | 49.0 | 22.2 | 5.0 | 5.3 | 14.3 | 4.2 | 0.96 |
| | 006 | 271 | 69 | 26 | 530 | 1.07 | 61 | 175 | 6.63 | 50.5 | 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 | 86 | 33 | 773 | 0.51 | 40 | 276 | 6.04 | 50.7 | 22.9 | 4.0 | 5.3 | 12.5 | 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 | 15.3 | 4.6 | 0.93 |
| | 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 | 158 | 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 | 5.0 | 5.5 | 13.9 | 3.7 | 1.00 |
| 10% | 013 | 330 | 84 | 33 | 522 | 0.64 | 39 | 220 | 5.80 | 51.4 | 21.5 | 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 | 693 | 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-Cho. (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 | 13.3 | 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 | 105 |
| | Mean | 58 | 71 | 93 | 131 | 12.7 | 0.85 | 0.53 | 0.27 | 10.3 | 7.2 | 144 | 4.47 | 107 |
| 5% | 007 | 66 | 125 | 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 | 83 | 132 | 12.7 | 0.93 | 0.48 | 0.26 | 10.2 | 8.3 | 142 | 4.84 | 106 |
| | 011 | 40 | 38 | 66 | 127 | 14.0 | 0.63 | 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 | 53 | 97 | 106 | 12.2 | 0.85 | 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 | 0.50 | 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 | 105 |
| | 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 | 0.53 | 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 | 0.23 | 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 (%) | $\alpha_1$-G (%) | $\alpha_2$-G (%) | $\alpha_3$-G (%) | β-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 | 57.5 | 18.9 | 5.5 | 2.2 | 11.6 | 4.3 | 1.35 |
| | 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 | 59.1 | 20.2 | 5.0 | 1.6 | 10.9 | 3.2 | 1.44 |
| | Mean | 320 | 76 | 25 | 441 | 0.39 | 316 | 171 | 6.39 | 56.2 | 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 | 57.3 | 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 | 355 | 75 | 23 | 329 | 0.20 | 370 | 241 | 6.15 | 58.8 | 13.0 | 5.9 | 3.5 | 13.9 | 4.9 | 1.43 |
| | 512 | 956 | 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 | 58.9 | 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 | 6.54 | 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 | 56.4 | 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 | 0.35 | 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 | 6.58 | 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-Cho. (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% | 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 | 15.2 | 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 | 0.55 | 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 | 0.52 | 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 | 0.57 | 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 | 0.85 | 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 | 0.28 |
| | 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 | Ca | 17.1 |
| Crude fat | 50.0 | $B_1$ | 0.23 | P | 386 |
| Carbohydrate | 4.3 | $B_2$ | 0.50 | K | 1120 |
| Crude fiber | 0.0 | $B_6$ | 0.54 | Na | 767 |
| Ash | 2.0 | $B_{12}$ | 0.0031 | Mg | 47.3 |
| Water | 0.9 | $D_3$ | ND | Fe | 6.26 |
| | | E | 0.2 | Zn | 9.99 |
| | | $K_1$ | ND | Cu | 0.14 |
| | | $K_2$ | 0.010 | S | 370 |
| | | Niacin | 12.1 | Mn | 0.03 |
| | | Pantotheinic acid | 2.55 | I | ND |
| | | Folic acid | 0.019 | Se | 0.03 |
| | | Biotin | 0.0042 | Mo | ND |
| | | Choline | 0.13 (%) | | |

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

(g/kg diets)

| Ingredient | Basal diet I | 5% diet | 10% diet | Basal diet II | 20% diet |
|---|---|---|---|---|---|
| Dried beef | | 50.000 | 100.000 | | 200.000 |
| Cornstarch | 397.486 | 398.019 | 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-Butylhydroqinone | 0.014 | 0.014 | 0.014 | 0.014 | 0.014 |
| Calolic 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 tbe 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

(g/kg Mix)

| Mineral Mix | | | | | | | Vitamin 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 |
| *ESSENTIAL MINERALS* | | | | | | | Vitamine A Palmitate (500,000IU/g) | 0.800 | 0.800 | 0.800 | 0.800 |
| Calcium Carbonate | Ca : 40.04 | 357.00 | 356.357 | 355.786 | 357.00 | 354.572 | | | | | |
| Potassium Phosphate (monobasic) | P : 22.76<br>K : 28.73 | 196.00 | 192.359 | 188.843 | 196.00 | 181.688 | Thiamine HCl ($B_1$) | 0.600 | 0.590 | 0.580 | 0.550 |
| Potassium Citrate $H_2O$ | K : 36.16 | 57.29* | 51.612 | 45.832 | 122.844* | | Riboflavin ($B_2$) | 0.600 | 0.580 | 0.550 | 0.500 |
| Sodium Chloride | Na : 39.34 | 74.00 | 45.584 | 17.242 | 114.00* | | Pyridoxine HCl ($B_6$) | 0.700 | 0.670 | 0.650 | 0.590 |
| Potassium Sulfate | S : 18.39<br>K : 44.87 | 57.47* | 28.735 | | 115.00* | | Vitamine $B_{12}$ (0.1%) | 2.500 | 2.300 | 2.200 | 1.900 |
| Magnesium Oxide | Mg : 60.32 | 24.00 | 22.871 | 21.788 | 24.00 | 19.529 | | | | | |
| Ferric Citrate | Fe : 16.50 | 6.06 | 5.541 | 5.021 | 6.06 | 3.809 | Vitamine $D_3$ (400,000IU/g) | 0.250 | 0.250 | 0.250 | 0.250 |
| Zinc Carbonate | Zn : 52.14 | 1.65 | 1.375 | 1.100 | 1.65 | 0.550 | | | | | |
| Manganous Carbonate | Mn : 47.79 | 0.63 | 0.630 | 0.630 | 0.63 | 0.620 | | | | | |
| Cupric Carbonate | Cu : 57.47 | 0.30 | 0.295 | 0.295 | 0.30 | 0.285 | Vitamine E Acetate (500IU/g) | 15.000 | 15.000 | 15.000 | 15.000 |
| Potassium Iodate | I : 59.30 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | | | | | |
| Sodium Selenate | Se : 41.79 | 0.01025 | 0.00957 | 0.00820 | 0.01025 | 0.00615 | Vitamine $K_1$ | 0.075 | 0.075 | 0.074 | 0.073 |
| Ammonium Paramolybdate $4H_2O$ | Mo : 54.34 | 0.00795 | 0.00795 | 0.00795 | 0.00795 | 0.00795 | | | | | |
| | | | | | | | Niacin | 3.000 | 3.000 | 3.000 | 3.000 |
| *NON-ESSENTIAL MINERALS* | | | | | | | | | | | |
| | | | | | | | Calcium Pantothenate | 1.600 | 1.500 | 1.300 | 1.100 |
| Sodium Metasilicate $9H_2O$ | Si : 9.88 | 1.45 | 1.45 | 1.45 | 1.45 | 1.45 | Folic Acid | 0.200 | 0.200 | 0.200 | 0.200 |
| Chromium Potassium Sulfate $12H_2O$ | Cr : 10.42 | 0.275 | 0.275 | 0.275 | 0.275 | 0.275 | | | | | |
| | | | | | | | Biotin | 0.020 | 0.020 | 0.019 | 0.018 |
| 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 Flouride | 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 | | 223.646 | 292.688 | 361.511 | 160.562 | 436.999 | Sucrose finely powdered | 974.655 | 975.015 | 975.376 | 976.018 |

* : Compotition is differ from that of the AIN standared diet.
The mineral mix and vitamin mix for each compotition was designed to reflect the mineral (essential miterals) and vitamin contents of the dried beef at each additionnl level.

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

(g)

| Conc. in diet | Number of animals | Day 1 | 7 | 14 | 21 | 28 | Gain 0~28 |
|---|---|---|---|---|---|---|---|
| 0% a) | 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% b) | 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

(g)

| Conc. in diet | Number of animals | Day 1 | 7 | 14 | 21 | 28 | Gain 0~28 |
|---|---|---|---|---|---|---|---|
| 0% a) | 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% b) | 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 5 Food consumption of male rats fed the dry beef-contained diet in a 28day dose range-finding test

(g/day/rat)

| Conc. in diet | Number of animals | Week 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 0% a) | 6 | 18 ± 1 | 21 ± 1 | 22 ± 2 | 22 ± 1 |
| 5% | 6 | 18 ± 2 | 19 ± 2 | 21 ± 3 | 21 ± 3 |
| 10% | 6 | 17 ± 1 | 19 ± 1 | 20 ± 2 | 18 ± 1 |
| 0% b) | 6 | 17 ± 1 | 19 ± 2 | 20 ± 2 | 17 ± 0 |
| 20% | 6 | 16 ± 1 | 18 ± 3 | 17 ± 3 | 15 ± 5 |

Each value is expressed as mean±S.D.
a):Control I b):Control II

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

(g/day/rat)

| Conc. in diet | Number of animals | Week 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 0% a) | 6 | 13 ± 1 | 14 ± 2 | 15 ± 1 | 15 ± 2 |
| 5% | 6 | 13 ± 2 | 13 ± 3 | 15 ± 1 | 15 ± 1 |
| 10% | 6 | 14 ± 1 | 14 ± 2 | 14 ± 3 | 13 ± 1 |
| 0% b) | 6 | 14 ± 1 | 14 ± 1 | 15 ± 0 | 15 ± 2 |
| 20% | 6 | 13 ± 1 | 14 ± 1 | 13 ± 1 | 14 ± 1 |

Each value is expressed as mean±S.D.
a):Control I b):Control II

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 | Cloudy | | pH | | | | | | | Protein | | | | | Glucose | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PY | − | + | 5.0 | 6.0 | 6.5 | 7.0 | 7.5 | 8.0 | 8.5 | − | ± | + | ++ | +++ | − | ± | + | ++ | ++ |
| 0%[a] | 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%[b] | 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%[a] | 6 | 4 | 2 | | | | 6 | | | | | 6 | | | | | 6 | | | |
| 5% | 6 | 5 | 1 | | | | 6 | | | | | 6 | | | | | 6 | | | |
| 10% | 6 | 5 | 1 | | | | 4 | | 2 | | | 6 | | | | | 6 | | | |
| 0%[b] | 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 | Cloudy | | pH | | | | | | | Protein | | | | | Glucose | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PY | − | + | 5.0 | 6.0 | 6.5 | 7.0 | 7.5 | 8.0 | 8.5 | − | ± | + | ++ | +++ | − | ± | + | ++ | ++ |
| 0%[a] | 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%[b] | 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%[a] | 6 | 6 | | | | | 6 | | | | | 6 | | | | | 6 | | | |
| 5% | 6 | 6 | | | | | 3 | 2 | 1 | | | 6 | | | | | 6 | | | |
| 10% | 6 | 6 | | | | | 6 | | | | | 6 | | | | | 6 | | | |
| 0%[b] | 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 ($10^4$/μL) | Hb (g/dL) | Ht (%) | MCV (fL) | MCH (pg) | MCHC (%) | PT (sec) | APTT (sec) | WBC ($10^3$/μL) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0%[a] | 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 |
| 0%[b] | 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 |
| 20% | 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 |

| Conc. in diet | No. of animals | Differential leukocyte counts (%) Baso. | Eosin. | Neutro. Stab. | Neutro. Seg. | Lymph. | Mono. | Other | Plat. ($10^4$/μL) |
|---|---|---|---|---|---|---|---|---|---|
| 0%[a] | 6 | 0 ± 0 | 1 ± 1 | 0 ± 0 | 14 ± 5 | 83 ± 6 | 2 ± 1 | 0 ± 0 | 132 ± 9 |
| 5% | 6 | 0 ± 0 | 1 ± 1 | 0 ± 0 | 14 ± 4 | 84 ± 4 | 1 ± 1 | 0 ± 0 | 119 ± 16 |
| 10% | 6 | 0 ± 0 | 1 ± 2 | 0 ± 0 | 12 ± 4 | 86 ± 5 | 2 ± 1 | 0 ± 0 | 143 ± 47 |
| 0%[b] | 6 | 0 ± 0 | 0 ± 1 | 0 ± 0 | 15 ± 4 | 83 ± 5 | 1 ± 1 | 0 ± 0 | 124 ± 18 |
| 20% | 6 | 0 ± 0 | 1 ± 1 | 0 ± 0 | 12 ± 3 | 86 ± 4 | 1 ± 1 | 0 ± 0 | 134 ± 50 |

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 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 ($10^4$/μL) | Hb (g/dL) | Ht (%) | MCV (fL) | MCH (pg) | MCHC (%) | WBC ($10^3$/μL) | Plat. ($10^4$/μL) | PT (sec) | APTT (sec) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0%[a] | 6 | 762 ± 28 | 15.0 ± 0.3 | 42.0 ± 1.2 | 55 ± 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 |
| 0%[b] | 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 |
| 20% | 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) | γ-GTP (IU/L) | ChE (IU/L) | CK (IU/L) | T.P. (g/dL) | Alb (%) | $\alpha_1$-G (%) | $\alpha_2$-G (%) | $\alpha_3$-G (%) | β-G (%) | γ-G (%) | A/G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0%[a] | 6 | 323 ± 119 | 82 ± 8 | 30 ± 3 | 666 ± 164 | 0.56 ± 0.26 | 50 ± 10 | 223 ± 34 | 5.84 ± 0.22 | 50.7 ± 2.1 | 22.8 ± 1.6 | 5.5 ± 0.9 | 2.9 ± 0.5 | 14.3 ± 1.0 | 3.9 ± 0.9 | 1.03 ± 0.09 |
| 5% | 6 | 238 ± 84 | 75 ± 8 | 28 ± 2 | 736 ± 135 | 0.47 ± 0.12 | 49 ± 5 | 220 ± 87 | 5.88 ± 0.32 | 52.6 ± 1.6 | 21.9 ± 0.9 | 6.0 ± 1.0 | 2.8 ± 0.5 | 13.5 ± 1.0 | 3.2 ± 0.7 | 1.11 ± 0.07 |
| 10% | 6 | 344 ± 98 | 74 ± 12 | 32 ± 3 | 799 ± 164 | 0.20** ± 0.11 | 41 ± 7 | 288 ± 42 | 5.83 ± 0.19 | 52.2 ± 6.0 | 23.2 ± 2.9 | 5.2 ± 1.3 | 2.7 ± 0.7 | 13.4 ± 3.8 | 3.3 ± 1.4 | 1.12 ± 0.25 |
| 0%[b] | 6 | 403 ± 57 | 82 ± 6 | 28 ± 3 | 710 ± 305 | 0.41 ± 0.25 | 51 ± 10 | 249 ± 43 | 5.89 ± 0.12 | 50.3 ± 1.7 | 24.0 ± 5.5 | 4.9 ± 1.2 | 3.4 ± 0.8 | 12.9 ± 3.0 | 4.5 ± 0.5 | 1.01 ± 0.07 |
| 20% | 6 | 339 ± 170 | 96 ± 18 | 32 ± 5 | 1086 ± 187 | 0.55 ± 0.42 | 41 ± 4 | 228 ± 69 | 5.66# ± 0.14 | 51.5 ± 2.6 | 21.0 ± 2.1 | 5.6 ± 1.2 | 3.7 ± 1.1 | 13.9 ± 1.4 | 4.3 ± 1.0 | 1.07 ± 0.11 |

| Conc. in diet | No. of animals | T-Cho. (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%[a] | 6 | 52 ± 12 | 55 ± 28 | 84 ± 18 | 115 ± 11 | 12.8 ± 2.0 | 0.96 ± 0.21 | 0.49 ± 0.05 | 0.28 ± 0.02 | 9.9 ± 0.3 | 7.6 ± 0.5 | 144 ± 1 | 4.22 ± 0.19 | 105 ± 1 |
| 5% | 6 | 47 ± 14 | 60 ± 18 | 85 ± 15 | 136* ± 15 | 10.6 ± 2.5 | 1.07 ± 0.31 | 0.53 ± 0.07 | 0.25 ± 0.04 | 9.9 ± 0.5 | 8.3 ± 0.7 | 144 ± 1 | 4.53 ± 0.39 | 105 ± 1 |
| 10% | 6 | 42 ± 4 | 41 ± 17 | 75 ± 8 | 126 ± 10 | 11.3 ± 2.3 | 1.26 ± 0.15 | 0.53 ± 0.09 | 0.27 ± 0.03 | 9.6 ± 0.1 | 8.1 ± 0.4 | 145 ± 1 | 4.65 ± 0.67 | 107 ± 1 |
| 0%[b] | 6 | 43 ± 8 | 34 ± 14 | 71 ± 12 | 120 ± 6 | 11.1 ± 2.1 | 0.94 ± 0.10 | 0.47 ± 0.03 | 0.28 ± 0.03 | 9.7 ± 0.4 | 8.2 ± 0.6 | 146 ± 1 | 4.59 ± 0.36 | 106 ± 2 |
| 20% | 6 | 39 ± 6 | 31 ± 10 | 75 ± 7 | 129 ± 15 | 12.8 ± 1.6 | 1.37 ± 0.30 | 0.52 ± 0.07 | 0.28 ± 0.03 | 9.4 ± 0.3 | 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) | γ-GTP (IU/L) | ChE (IU/L) | CK (IU/L) | T.P. (g/dL) | Alb (%) | $\alpha_1$-G (%) | $\alpha_2$-G (%) | $\alpha_3$-G (%) | β-G (%) | γ-G (%) | A/G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0%[a] | 6 | 378 ± 106 | 84 ± 5 | 26 ± 5 | 415 ± 55 | 0.49 ± 0.19 | 257 ± 85 | 221 ± 73 | 6.33 ± 0.32 | 57.4 ± 1.3 | 18.5 ± 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 | 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 | 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%[b] | 6 | 609 ± 200 | 81 ± 6 | 26 ± 2 | 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 ± 0.9 | 12.3 ± 1.0 | 3.3 ± 1.3 | 1.49 ± 0.12 |
| 20% | 6 | 495 ± 229 | 78 ± 4 | 26 ± 2 | 462 ± 55 | 0.23# ± 0.08 | 371# ± 67 | 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-Cho. (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%[a] | 6 | 54 ± 12 | 20 ± 6 | 99 ± 15 | 117 ± 12 | 16.5 ± 2.7 | 0.89 ± 0.22 | 0.64 ± 0.09 | 0.25 ± 0.03 | 9.7 ± 0.4 | 6.7 ± 0.9 | 143 ± 1 | 4.11 ± 0.32 | 106 ± 2 |
| 5% | 6 | 51 ± 9 | 20 ± 12 | 93 ± 16 | 122 ± 11 | 14.7 ± 3.6 | 1.20 ± 0.29 | 0.63 ± 0.10 | 0.27 ± 0.03 | 9.8 ± 0.2 | 6.8 ± 1.0 | 144 ± 1 | 4.14 ± 0.37 | 107 ± 1 |
| 10% | 6 | 52 ± 12 | 13 ± 5 | 95 ± 16 | 107 ± 7 | 15.1 ± 3.0 | 1.13 ± 0.11 | 0.66 ± 0.07 | 0.27 ± 0.03 | 9.6 ± 0.2 | 6.6 ± 0.6 | 145 ± 1 | 4.28 ± 0.22 | 110* ± 2 |
| 0%[b] | 6 | 51 ± 8 | 14 ± 4 | 91 ± 10 | 122 ± 15 | 14.2 ± 2.2 | 0.92 ± 0.16 | 0.60 ± 0.05 | 0.26 ± 0.03 | 9.8 ± 0.3 | 6.4 ± 0.7 | 145 ± 1 | 4.27 ± 0.27 | 108 ± 2 |
| 20% | 6 | 45 ± 8 | 20 ± 13 | 90 ± 16 | 127 ± 6 | 17.8 ± 5.2 | 1.18 ± 0.29 | 0.68# ± 0.06 | 0.27 ± 0.02 | 9.8 ± 0.3 | 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[a] | 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 |
| | 0[b] | 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 |
| Relative[c] | 0[a] | 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 |
| | 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[b] | 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 |
| | 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 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) | Semi.v (g) | Epidid. (g) |
|---|---|---|---|---|---|---|---|---|
| Absolute | 0[a] | 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 |
| | 0[b] | 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 |
| Relative[c] | 0[a] | 6 | 314 ±9 | 17.0 ±1.3 | 0.84 ±0.04 | 0.15 ±0.02 | 0.46 ±0.04 | 0.23 ±0.02 |
| | 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[b] | 6 | 299 ±36 | 17.2 ±1.5 | 0.89 ±0.09 | 0.16 ±0.03 | 0.47 ±0.06 | 0.24 ±0.03 |
| | 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| solute | 0[a] | 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[b] | 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 |
| elative[c] | 0[a] | 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 |
| | 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[b] | 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 1 Individual body weights of male rats fed the dry beef-contained diet in a 28day dose range-finding test

(g)

| Conc. in diet | Animal number | Day 0 | 7 | 14 | 21 | 28 |
|---|---|---|---|---|---|---|
| 0% a) | 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% b) | 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 2 Individual body weights of female rats fed the dry beef-contained diet in a 28day dose range-finding test

(g)

| Conc. in diet | Animal number | Day 0 | 7 | 14 | 21 | 28 |
|---|---|---|---|---|---|---|
| 0% a) | 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% b) | 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 4 Individual food consumption of female rats fed the dry beef-contained diet in a 28day dose range-finding test

(g/day/rat)

| Conc. in diet | Cage number | week 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 0% a) | 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 | 15 | 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% b) | 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

(g/day/rat)

| Conc. in diet | Cage number | week 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 0% a) | 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% b) | 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0% a) | 001 | PY | − | 6.5 | ± | − | ± | − | 0.1 | − |
| | 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 | − |
| | 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 | − |
| | 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

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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0% b) | 019 | PY | − | 6.0 | ± | − | − | − | 0.1 | − |
| | 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 | − |
| | 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

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% a) | 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 | − | 6.5 | − | − | − | + | 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 | Glucoee | Ketone body | Occult blood | Urobilinogen | Bilirubin |
|---|---|---|---|---|---|---|---|---|---|---|
| 0% b) | 519 | PY | − | 7.5 | ± | − | − | − | 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 ($10^4$/μL) | Hb (g/dL) | Ht (%) | MCV (fL) | MCH (pg) | MCHC (%) | PT (sec) | APTT (sec) | WBC ($10^3$/μL) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0%[a)] | 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 | 42.5 | 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 | 18.6 | 35.1 | 12.9 | 18.5 | 86 |
| | 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 | 46 |
| | 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 | 56 | 19.4 | 34.6 | 13.6 | 19.1 | 46 |
| 0%[b)] | 019 | 794 | 13.1 | 39.1 | 49 | 16.5 | 33.5 | 12.8 | 16.8 | 49 |
| | 020 | 758 | 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 | 13.5 | 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 | 58 | 19.4 | 33.5 | 13.4 | 20.1 | 57 |
| | Mean | 756 | 14.6 | 42.8 | 57 | 19.3 | 34.0 | 13.4 | 19.7 | 51 |
| 20% | 025 | 718 | 10.0 | 32.2 | 45 | 13.9 | 31.1 | 13.9 | 18.7 | 32 |
| | 026 | 820 | 15.4 | 44.1 | 54 | 18.8 | 34.9 | 14.1 | 16.3 | 25 |
| | 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. ($10^3$/μL) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Neutro. | | | | | |
| | | Baso. | Eosin. | Stab. | Seg. | Lymph. | Mono. | Other | |
| 0%[a)] | 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 | 105 |
| | 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%[b)] | 019 | 0 | 0 | 0 | 12 | 88 | 0 | 0 | 126 |
| | 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 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 ($10^4/\mu L$) | Hb (g/dL) | Ht (%) | MCV (fL) | MCH (pg) | MCHC (%) | WBC ($10^3/\mu L$) | Plat. ($10^4/\mu L$) | PT (sec) | APTT (sec) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0%[a] | 501 | 765 | 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 | 103 | 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 | 55 | 19.7 | 35.8 | 37 | 104 | 12.8 | 18.1 |
| 5% | 507 | 780 | 15.1 | 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 | 52 | 18.3 | 35.1 | 28 | 126 | 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 | 35.3 | 28 | 118 | 13.4 | 18.0 |
| | Mean | 787 | 15.3 | 43.1 | 55 | 19.5 | 35.5 | 29 | 126 | 13.0 | 18.0 |
| 0%[b] | 519 | 756 | 15.4 | 44.0 | 58 | 20.4 | 35.0 | 25 | 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 | 19.6 | 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 | 759 | 13.8 | 38.6 | 51 | 18.2 | 35.8 | 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 | 35.3 | 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 (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 (%) | $\alpha_1$-G (%) | $\alpha_2$-G (%) | $\alpha_3$-G (%) | β-G (%) | γ-G (%) | A/G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0%[a] | 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 | 0.53 | 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 | 6.05 | 51.8 | 21.2 | 5.4 | 2.6 | 14.7 | 4.3 | 1.07 |
| | 004 | 537 | 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 | 2.3 | 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 | 5.5 | 2.9 | 14.3 | 3.9 | 1.03 |
| 5% | 007 | 377 | 79 | 30 | 737 | 0.58 | 50 | 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 | 0.45 | 45 | 164 | 5.93 | 53.8 | 23.2 | 5.4 | 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 | 54.1 | 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%[b] | 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 | 650 | 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 | 1151 | 0.15 | 35 | 299 | 5.60 | 50.2 | 18.0 | 6.3 | 5.2 | 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-Cho. (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%[a)] | 001 | 45 | 39 | 81 | 102 | 13.3 | 1.10 | 0.50 | 0.24 | 9.3 | 7.1 | 145 | 4.29 | 106 |
| | 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 | 46 | 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 | 4.06 | 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 | 0.54 | 0.28 | 9.4 | 8.0 | 145 | 5.08 | 106 |
| | 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 | 0.52 | 0.28 | 9.6 | 7.6 | 146 | 4.42 | 108 |
| | 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 | 136 | 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 | 75 | 126 | 11.3 | 1.26 | 0.53 | 0.27 | 9.6 | 8.1 | 145 | 4.65 | 107 |
| 0%[b)] | 019 | 39 | 40 | 66 | 129 | 9.9 | 1.10 | 0.50 | 0.25 | 9.6 | 7.7 | 146 | 5.21 | 107 |
| | 020 | 55 | 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 | 14.3 | 0.89 | 0.47 | 0.23 | 9.8 | 8.5 | 145 | 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 | 13.7 | 1.93 | 0.51 | 0.33 | 9.5 | 7.6 | 143 | 5.12 | 103 |
| | 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 | 6.6 | 145 | 4.29 | 105 |
| | 030 | 34 | 24 | 65 | 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 | 0.52 | 0.28 | 9.4 | 7.3 | 144 | 4.25 | 104 |

a) : Control I, b) : Control II

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 (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 (%) | $\alpha_1$-G (%) | $\alpha_2$-G (%) | $\alpha_3$-G (%) | β-G (%) | γ-G (%) | A/G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0%[a)] | 501 | 465 | 86 | 26 | 470 | 0.28 | 216 | 264 | 6.23 | 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 | 20.6 | 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 | 56.2 | 20.0 | 5.4 | 2.4 | 13.4 | 2.6 | 1.28 |
| | Mean | 378 | 84 | 26 | 415 | 0.49 | 257 | 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 | 5.56 | 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 | 3.9 | 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 | 165 | 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 | 2.5 | 12.3 | 3.7 | 1.30 |
| 10% | 513 | 505 | 82 | 22 | 563 | 0.28 | 420 | 173 | 5.88 | 59.2 | 13.2 | 5.2 | 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 | 685 | 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%[b)] | 519 | 672 | 86 | 26 | 460 | 0.37 | 299 | 192 | 5.90 | 60.1 | 17.5 | 4.7 | 2.2 | 12.1 | 3.4 | 1.51 |
| | 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 | 355 | 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 | 715 | 75 | 23 | 378 | 0.17 | 402 | 236 | 6.84 | 57.4 | 16.9 | 4.2 | 3.0 | 13.2 | 5.3 | 1.35 |
| | 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 | 146 | 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 |

a) : Control I, b) : Control II

Appendix 10 · 2 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 | T-Cho. (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%[a)] | 501 | 50 | 16 | 95 | 116 | 19.5 | 1.12 | 0.74 | 0.21 | 9.6 | 6.9 | 144 | 3.81 | 103 |
| | 502 | 35 | 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 | 5.7 | 144 | 4.33 | 109 |
| | Mean | 54 | 20 | 99 | 117 | 16.5 | 0.89 | 0.64 | 0.25 | 9.7 | 6.7 | 143 | 4.11 | 106 |
| 5% | 507 | 46 | 13 | 81 | 106 | 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 | 0.52 | 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 | 1.34 | 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%[b)] | 519 | 54 | 16 | 96 | 94 | 13.4 | 0.91 | 0.59 | 0.21 | 9.5 | 5.6 | 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 | 17.6 | 0.75 | 0.59 | 0.26 | 9.6 | 6.2 | 144 | 4.07 | 107 |
| | 522 | 40 | 10 | 77 | 134 | 13.1 | 1.03 | 0.52 | 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 | 4.15 | 107 |
| | 524 | 47 | 14 | 94 | 134 | 15.6 | 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 | 125 | 10.1 | 0.89 | 0.66 | 0.26 | 10.2 | 6.6 | 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 | 25.5 | 1.16 | 0.70 | 0.27 | 9.3 | 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[a)] | 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 |
| | 006 | 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 | 0.68 | 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[b)] | 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 |
| | 020 | 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 | 2.65 | 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 | 18.7 | 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

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%) | Pitui. (mg%) | Adrenal (mg%) | Testis (%) | Prost. (%) | Semi.v (%) | Epidid. (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0[a] | 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[b] | 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) | Pitui. (mg) | Adrenal (mg) | Ovary (mg) | Uterus (g) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0[a] | 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 | 0.46 | 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[b] | 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[a] | 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[b] | 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