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Chemical Category PP581 FORMULATION		

8(e)

CAP

(COMPLIANCE AUDIT PROGRAM)

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August 28, 1992

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Environmental Protection Agency
401 M Street, S.W.
Washington, DC 20460

ICI Americas Inc.
Safety, Health &
Environmental Affairs Group
Wilmington
Delaware 19897
Telephone (302) 886-3000
Fax (302) 886-5585

Attention: Section 8(e) Coordinator (CAP Agreement)

Dear Sir/Madam:

The enclosed study/report is submitted to EPA in accordance with the requirements and established guidelines of the TSCA Section 8(e) Compliance Audit Program (CAP). We do not consider any of the documents submitted under the CAP to be Confidential Business Information.

Company Name: ICI AMERICAS INC.

CAP Identification Number: 8ECAP-0040

Address: WILMINGTON, DE 19897

Telephone Number: (302) 886-5503

Chemical/Mixture Identity: 3(3-(4'-Bromo-(1,1'-Bi-Phenyl)-4-Yl)-1,2,3,4-Tetra Hydro-1-Naphthaleny)-4-Hydroxy -2H-1 Benzopyran-2-One

CAS Registry Number(s): 56073-10-0

Study/Report Number: CTL/P/382

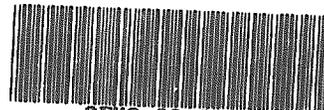
Study/Report Title: Acute Toxicity and Local Irritation

Study/Report Summary: SUMMARY ATTACHED

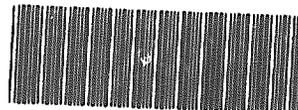
Previous Submission Type & Document Control No.: N/A

Sincerely,

S. E. Malovrh
Director, Environmental Affairs



JEHQ-92-8478
INIT 08/28/92



88920007121

IMPERIAL CHEMICAL INDUSTRIES LIMITED
CENTRAL TOXICOLOGY LABORATORY

CATEGORY B REPORT (██████████)
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DIVISION: PLANT PROTECTION
DIV REF : S28/77
CTL REF : Z1430
COPY NO : 33

REPORT NO: CTL/P/382

I
22

PP581 FORMULATION (JFU 5074):
ACUTE TOXICITY AND LOCAL IRRITATION

by

G R Parkinson

Date of issue: 25 NOV 1977

SUMMARY

The acute oral LD50 value and 95% confidence limits to male rats were calculated to be 0.136(0.122-0.151) ml JFU 5074/kg, which are equivalent to 0.339(0.305-0.377) mg PP581/kg. The value to female rats could not be calculated from the mortality data although the data indicates that the LD50 figure lies between 0.128-0.160ml JFU5074/kg (0.32-0.40mg PP581/kg). The 24-hour dermal toxicity to both male and female rabbits was estimated to be 1 ml JFU5074/kg (2.50mg PP581/kg). The formulation was slightly irritant to rabbit skin and mildly irritant to rabbit eyes. It did not cause sensitisation of guinea pig skin.

POSSIBLE EFFECTS IN MAN

The formulation is unlikely to prove hazardous if handled as directed.

RECOMMENDED HANDLING PRECAUTIONS

The usual practices of good personal hygiene should suffice.

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CENTRAL TOXICOLOGY LABORATORY

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REPORT NO: CTL/P/382

PP581 FORMULATION (JFU 5074):
ACUTE TOXICITY AND LOCAL IRRITATION

We, the undersigned, declare that this report constitutes a true record of the actions undertaken and the results obtained in the above study.

	<u>SECTION</u>	<u>SECTION HEAD</u>
Victoria K Lefevre	Acute Toxicity	Dr S E Jagers
<i>Victoria K Lefevre</i>		<i>S E Jagers</i>

G R Parkinson
Study Investigator *R Parkinson*

S E Jagers
Project Manager/Approved by *S E Jagers*

PP581 FORMULATION (JFU 5074) : ACUTE TOXICITY AND LOCAL IRRITATION

SUMMARY

The acute oral LD50 value and 95% confidence limits to male rats were calculated to be 0.136(0.122-0.151) ml JFU 5074/kg, which are equivalent to 0.339(0.305-0.377) mg PP581/kg. The value to female rats could not be calculated from the mortality data although the data indicates that the LD50 figure lies between 0.128-0.160ml JFU5074/kg (0.32-0.40mg PP581/kg). The 24-hour dermal toxicity to both male and female rabbits was estimated to be 1 ml JFU5074/kg (2.50mg PP581/kg). The formulation was slightly irritant to rabbit skin and mildly irritant to rabbit eyes. It did not cause sensitisation of guinea pig skin.

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1. INTRODUCTION

JFU 5074 is a 0.25% (w/v) liquid concentrate formulation of the rodenticide PP581(3-[3-(4'-bromo-4-biphenyl)-1,2,3,4-tetrahydronaphth-1-yl]-4-hydroxycoumarin). A sample of this formulation was submitted to the Laboratory in July 1977 for an assessment of its acute toxicity and local irritation. The work was carried out between August and October 1977.

2. MATERIALS AND METHODS

2.1 Sample The sample received was a colourless liquid. It was tested as the undiluted formulation; as an aqueous dilution, or as a dilution in polyethylene glycol 300 (PEG 300).

2.2 Animals The experiments were carried out on rats (Alderley Park SPF albino, body weight ranges 140-200 g male and 120-160 g female), guinea pigs (Duncan Hartley albino, body weight range 200-400 g) or rabbits (New Zealand white, body weight range 1.8 - 3 kg).

2.3 Animal husbandry

2.3.1 Rat The rats were housed in suspended galvanised wire mesh cages (280 mm length X 320 mm width X 145 mm height) with a maximum of five per cage. The sexes were housed separately.

The animals were fed ad libitum with Oakes' Rat Diet with extra vitamin E (Appendix A), and allowed tap water ad libitum via an automatic watering system.

The room in which the rats were held was maintained at a temperature between 20 and 22°C, and there were ten air changes per hour.

The rats were acclimatised to the animal laboratory for a minimum of six days immediately prior to the experiment.

2.3.2 Guinea Pigs The guinea pigs were housed in suspended galvanised wire mesh cages (280 mm length X 320 mm width X 145 mm height) with one animal per cage.

The animals were fed ad libitum with Dixom's RGP Guinea Pig Diet (Appendix B) and allowed tap water ad libitum via an automatic watering system.

The room in which the guinea pigs were held was maintained at a temperature between 18 and 20°C, and there were ten air changes per hour.

The guinea pigs were acclimatised to the animal laboratory for a minimum of six days immediately prior to the experiment.

2.3.3 Rabbit The rabbits were housed in galvanised wire mesh cages (540 mm length X 370 mm width X 310 mm height) with one animal per cage.

The animals were fed ad libitum with Spratt's Pelletised Rabbit Diet (Appendix C), and allowed tap water ad libitum via an automatic watering system.

The room in which the rabbits were held was maintained at a temperature between 21 and 24°C. There was no forced ventilation in the room.

2.4 Test Methods

2.4.1 Acute oral toxicity Groups of five male and five female rats were fasted for 16-20 hours. The material, as an aqueous dilution, was then administered to the animals by means of a stomach tube and the rats observed for two weeks. A standard volume of 10 ml/kg was dosed to each animal, differences in dose level being achieved by altering the dilution. The acute oral LD50 value and 95% confidence limits were calculated from the results.

2.4.2 Acute dermal toxicity This was assessed using the method outlined by Draize (1959). Groups of four male and four female rabbits were used. The day before the experiment began, the animals were prepared for testing by removing the hair from an area approximately 150 mm X 130 mm on the dorso-lumbar region with a pair of veterinary clippers. Immediately before JFU 5074 was applied, half of the rabbits (ie two male and two female in each group) were further prepared by making epidermal abrasions every 20-30 millimeters longitudinally over the area of exposure. The abrasions were made using a scalpel blade and were sufficiently deep to penetrate the stratum corneum, but not to disturb the derma (that is, they did not cause bleeding).

The material, as a dilution in PEG 300, was then applied to the shorn backs and held in contact with the skins for 24 hours by means of occlusive dressings. Each dressing consisted of an aluminium foil patch (175 mm X 125 mm) to cover the treated area, held in position by adhesive polyethylene tape (300mm X 50mm) passed once around the body of the animal. A 4500 mm X 75 mm crepe bandage was then wrapped around the trunk of the rabbit. At the end of the 24-hour contact period, the dressings were removed, the skins cleansed with 1% cetrimide solution and the animals observed for two weeks.

2.4.3 Skin irritation This was assessed using the Draize method (1959). Single 24-hour applications of the undiluted liquid were made to 25 mm square areas of both intact and abraded skin on the shorn backs of a group of rabbits. As in the dermal toxicity study, the animals were clipped the day before the test began and the abraded areas prepared just before the formulation was applied. The treated areas were covered by patches, each of which consisted of surgical gauze backed by a piece of rubber sheeting. The patches were held in position by adhesive polyethylene tape (300mm X 50mm) passed once around the trunk of the animal. A 4500 mm X 75 mm crepe bandage was then wrapped around the body of the rabbit. The dressings were removed after 24 hours and the skins washed with 1% cetrimide solution.

Assessments of irritation, using the Draize scale (1959), were made both immediately after removal of the dressings and 48 hours later.

2.4.4 Eye irritation JFU 5074 (0.1 ml/eye) was placed in the conjunctival sac of the right or left eyes of a group of three male and six female rabbits. In the case of the three male animals the eyes were washed with 20 ml of clean lukewarm water four seconds after instillation of the formulation. The eyes were then observed at regular intervals for seven days and the ocular lesions scored using the Draize scale (1959). A modified form of the system described by Kay and Calandra (1962) was used to interpret and classify the numerical scores.

2.4.5 Skin sensitisation The sensitising properties of JFU 5074 were assessed using the Maximisation Test of Magnusson and Kligman (1970). The test was carried out using male guinea pigs and it involved two main procedures - an induction of the response and a challenge of that response.

induction was in two parts:-

(a) Intradermal injections were made to the shorn scapular region. A row of three injections (each of 0.05 ml in volume) was made on each side of the midline. These were:-

- (i) Freund's complete adjuvant alone
- (ii) JFU 5074 alone (as a 1 in 5 aqueous dilution)
- (iii) JFU 5074 emulsified with Freund's adjuvant (ratio 1 : 4).

(b) One week later the same area was shaved and a non-irritating concentration of the formulation (1 in 2.5 aqueous dilution) applied under an occlusive dressing to the whole area of the injection site for 48 hours.

The animals were challenged, two weeks after topical inductions, with a non-irritating concentration of the test agent (undiluted). The formulation was placed on filter paper and applied topically, for 24 hours, under an occlusive dressing to the shorn flanks. The challenge site was examined 24 hours after removal of the dressings. Any reactions were quantified using a four point scale and the number of positive responses was recorded.

3. EXPERIMENTAL RESULTS

3.1 Acute oral toxicity

JFU 5074 was administered to groups of five male and five female rats. The mortality data are tabulated below:-

Male

Time after dosing (days)	Dose (ml JFU 5074/kg) and cumulative mortality					
	0.1	0.12	0.128	0.16	0.2	0.4
18/24 hours	0/5	0/5	0/5	0/5	0/5	0/5
3	0/5	0/5	0/5	1/5	1/5	4/5
5	0/5	0/5	1/5	1/5	5/5	4/5
7	0/5	0/5	2/5	4/5		5/5
10	0/5	0/5	2/5	4/5		
14	0/5	0/5	3/5	4/5		

Female

Time after dosing (days)	Dose (ml JFU 5074/kg) and cumulative mortality					
	0.1	0.128	0.16	0.18	0.2	0.4
18/24 hours	0/5	0/5	0/5	0/5	0/5	0/5
3	0/5	0/5	0/5	1/5	0/5	2/5
5	0/5	0/5	4/5	4/5	3/5	2/5
7	0/5	0/5	5/5	5/5	5/5	4/5
10	0/5	0/5				5/5

The acute oral LD50 value and 95% confidence limits to male rats were calculated to be 0.136(0.122-0.151) ml JFU 5074/kg, which are equivalent to 0.339(0.305-0.377) mg PP581/kg. The value to female rats could not be calculated from the mortality data although the data indicates that the LD50 figure lies between 0.128-0.160ml JFU5074/kg(0.32-0.40mg PP581/kg).

During the experiment none of the surviving animals showed any signs of toxicity. The animals that died showed subdued behaviour, various external and subcutaneous haemorrhages, pilo-erection and loss of body weight. These toxic signs are typical of an anticoagulant effect.

3.2 Acute dermal toxicity

The formulation was applied to groups of four male and four female rabbits. The mortality data are shown below:-

Male

Time after dosing (days)	Dose (ml JFU 5074/kg) and cumulative mortality					
	0.5		1		2	
	I	A	I	A	I	A
1	0/2	0/2	0/2	0/2	0/2	0/2
3	0/2	0/2	0/2	0/2	0/2	0/2
7	0/2	0/2	0/2	0/2	0/2	0/2
10	0/2	0/2	1/2	0/2	1/2	0/2
14	0/2	1/2	1/2	1/2	1/2	0/2

Female

Time after dosing (days)	Dose (ml JFU 5074/kg) and cumulative mortality					
	0.5		1		2	
	I	A	I	A	I	A
1	0/2	0/2	0/2	0/2	0/2	0/2
3	0/2	0/2	0/2	0/2	0/2	0/2
7	0/2	0/2	0/2	0/2	2/2	1/2
10	0/2	0/2	0/2	2/2		1/2
14	0/2	0/2	0/2			1/2

I - Intact Skin

A - Abraded Skin

The acute dermal toxicity was thus estimated to be the same to both male and female rabbits viz 1 ml JFU5074/kg (equivalent to 2.50mg PP581/kg).

Signs of systemic toxicity were first observed five days after dosing and one of the survivors was still affected at the end of the two week observation period. The most notable effects were subdued behaviour, pallor, dyspnoea, pilo-erection and weight loss.

3.3 Skin irritation

The formulation (0.25 ml of the undiluted liquid) was applied to a group of six female rabbits. At the end of the 24-hour contact period two of the animals showed some erythema, although there were no signs of irritation on any of the animals after a further two days. Individual animal data are given in Table 1. As a result of this experiment JFU 5074 was classified as a slight irritant to rabbit skin.

3.4 Eye irritation

(a) Unwashed eyes Instillation of the formulation (0.1 ml/eye) into the right eyes of six female rabbits caused moderate initial pain (eyes held shut and occasionally rubbed with paws; class 3 on a 0-5 point scale). This was followed by mild redness and some chemosis of the conjunctivae. All the eyes appeared normal after four days. The mean results are tabulated below; individual animal data are shown in Table 2.

	MEAN SCORES*			
	Cornea (max 80)	Iris (max 10)	Conjunctiva (max 20)	Mean Total Score (max 110)
1-2 hr	-	0	7	7
Day 1	0	0	2	2
Day 2	0	0	1	1
Day 3	0	0	1	1
Day 4	0	0	0	0
Day 7	0	0	0	0

* values rounded to nearest whole number

(b) Washed eyes Instillation of JFU5074 (0.1 ml/eye) into the left eyes of three male rabbits caused some initial redness and chemosis of the conjunctivae. The mean results are given below; individual animal data are displayed in Table 3.

	MEAN SCORES			
	Cornea (max 80)	Iris (max 10)	Conjunctiva (max 20)	Mean Total Score (max 110)
1-2 hr	-	0	6	6
Day 1	0	0	0	0
Day 2	0	0	0	0
Day 3	0	0	0	0
Day 4	0	0	0	0
Day 7	0	0	0	0

- not assessed

JFU 5054 was thus classified as a mild irritant to rabbit eyes (class 4 on a 1-8 point scale).

Irrigation of eyes with clean warm water, soon after instillation of the formulation, almost completely eliminated the irritant response.

3.5 Skin sensitisation

A group of twenty test and eight control male guinea pigs was used.

The challenge applications did not produce any response on either the test or the control animals. The results thus indicated that JFU5074 was not a sensitiser to guinea pig skin.

4. DISCUSSION

The results of the experiments detailed in this report indicate that JFU5074 is a formulation of moderate systemic toxicity and little irritant potential. There should not, therefore, be any hazard associated with its correct usage.

5. REFERENCES

Berkson J J Am Statist Ass 39 357, 1944.

Draize J H Appraisal of the safety of chemicals in foods, drugs and cosmetics. Association of Food and Drug Officials of the United States. 46, 1959.

Kay J H and Calandra J.C J Soc cosmet Chem 13 6, 1962.

SKIN IRRITATION

TEST SUBSTANCE: JFU5074

SPECIES: RABBIT

DOSE: 0.25 ml

SEX: FEMALE

NUMBER OF ANIMALS: 6

OBSERVATION TIME	ANIMAL NUMBER											
	1		2		3		4		5		6	
	I	A	I	A	I	A	I	A	I	A	I	A
(a)	/	/	/	/	E1	E1	/	E1	/	/	/	/
(b)	/	/	/	/	/	/	/	/	/	/	/	/
Total Scores	0		0		2		1		0		0	
<p align="center">Primary Irritation Index = $\frac{\text{sum total}}{\text{number of observations}}$</p> <p align="center">= $\frac{3}{24}$ = 0.125</p>												

KEY

- (a) Immediately after end of contact period, ie 24 hours after material first applied.
- (b) 48 hours after end of contact period, ie 72 hours after material first applied.

I - intact skin

A - abraded skin

E - erythema

1 - slight

2 - mild

3 - moderate

TABLE 2 - RABBIT EYE IRRITATION TEST (INDIVIDUAL ANIMAL DATA)

TEST SUBSTANCE: JFU 5074 DOSE: 0.1 ml

ANIMAL NUMBER 1	SEX F EYE R INITIAL PAIN REACTION Moderate	CORNEA				IRIS			CONJUNCTIVA				TOTAL (Max 12)	
		Opacity		Area	Score	a	b	c	Score	d	e	f		Score
		a	b	b	a X b X 5	c	c X 5	d	(d+e+f) X 2					
1-2 hr		NOT ASSESSED			0	0	0	0	2	1	1	8	8	
Day 1		-	0	0	0	0	0	0	1	1	0	4	4	
Day 2		-	0	0	0	0	0	0	1	0	0	2	2	
Day 3		-	0	0	0	0	0	0	0	0	0	0	0	
Day 4		-	0	0	0	0	0	0	0	0	0	0	0	
Day 7		-	0	0	0	0	0	0	0	0	0	0	0	
1-2 hr		NOT ASSESSED			0	0	0	0	1	1	1	6	6	
Day 1		-	0	0	0	0	0	0	1	0	0	2	2	
Day 2		-	0	0	0	0	0	0	0	0	0	0	0	
Day 3		-	0	0	0	0	0	0	0	0	0	0	0	
Day 4		-	0	0	0	0	0	0	0	0	0	0	0	
Day 7		-	0	0	0	0	0	0	0	0	0	0	0	
1-2 hr		NOT ASSESSED			0	0	0	0	1	1	1	6	6	
Day 1		-	0	0	0	0	0	0	0	0	0	0	0	
Day 2		-	0	0	0	0	0	0	0	0	0	0	0	
Day 3		-	0	0	0	0	0	0	1	0	0	2	2	
Day 4		-	0	0	0	0	0	0	0	0	0	0	0	
Day 7		-	0	0	0	0	0	0	0	0	0	0	0	

- not relevant

(Cont) TABLE 2 - RABBIT EYE IRRITATION TEST (INDIVIDUAL ANIMAL DATA)

	CORNEA				IRIS		CONJUNCTIVA				TOTAL S
	Opacity		Area	Score	c	Score	Redness	Chemosis	Discharge	Score	(Max 11
	a	b		a X b X 5	c	c X 5	d	e	f	(d+e+f) X 2)
<u>ANIMAL NUMBER</u>	1-2 hr										
---	4...										
<u>SEX</u>	F										
<u>EYE</u>	R										
<u>INITIAL PAIN REACTION</u>	Moderate										
	Day 1	0	-	0	0	0	1	1	1	6	6
	Day 2	0	-	0	0	0	1	0	0	2	2
	Day 3	0	-	0	0	0	1	0	0	2	2
	Day 4	0	-	0	0	0	0	0	0	2	2
	Day 7	0	-	0	0	0	0	0	0	0	0
<u>ANIMAL NUMBER</u>	1-2 hr										
---	5										
<u>SEX</u>	F										
<u>EYE</u>	R										
<u>INITIAL PAIN REACTION</u>	Slight										
	Day 1	0	-	0	0	0	0	0	0	0	0
	Day 2	0	-	0	0	0	0	0	0	0	0
	Day 3	0	-	0	0	0	0	0	0	0	0
	Day 4	0	-	0	0	0	0	0	0	0	0
	Day 7	0	-	0	0	0	0	0	0	0	0
<u>ANIMAL NUMBER</u>	1-2 hr										
---	6										
<u>SEX</u>	F										
<u>EYE</u>	R										
<u>INITIAL PAIN REACTION</u>	Moderate										
	Day 1	0	-	0	0	0	1	1	1	6	6
	Day 2	0	-	0	0	0	1	1	0	4	4
	Day 3	0	-	0	0	0	0	0	0	0	0
	Day 4	0	-	0	0	0	0	0	0	0	0
	Day 7	0	-	0	0	0	0	0	0	0	0

- not relevant

TABLE 3 - RABBIT EYE IRRITATION TEST (INDIVIDUAL ANIMAL DATA)

TEST SUBSTANCE: JFU5074

DOSE: 0.1 ml (eyes washed with 20 ml clean lukewarm water 4 seconds after instillation of material).

ANIMAL NUMBER 1	CORNEA				IRIS			CONJUNCTIVA				TOTAL (Max 1)
	Opacity		Area	Score	c	c X 5	Redness	Chemosis	Discharge	Score		
	a	b	a X b X 5			d	e	f	(d+e+f) X 2			
1-2 hr	NOT ASSESSED			0	0	1	1	1	6	6		
Day 1	0	-	0	0	0	0	0	0	0	0		
Day 2	0	-	0	0	0	0	0	0	0	0		
Day 3	0	-	0	0	0	0	0	0	0	0		
Day 4	0	-	0	0	0	0	0	0	0	0		
Day 7	0	-	0	0	0	0	0	0	0	0		
1-2 hr	NOT ASSESSED			0	0	1	1	1	6	6		
Day 1	0	-	0	0	0	0	0	0	0	0		
Day 2	0	-	0	0	0	0	0	0	0	0		
Day 3	0	-	0	0	0	0	0	0	0	0		
Day 4	0	-	0	0	0	0	0	0	0	0		
Day 7	0	-	0	0	0	0	0	0	0	0		
1-2 hr	NOT ASSESSED			0	0	1	1	1	6	6		
Day 1	0	-	0	0	0	0	0	0	0	0		
Day 2	0	-	0	0	0	0	0	0	0	0		
Day 3	0	-	0	0	0	0	0	0	0	0		
Day 4	0	-	0	0	0	0	0	0	0	0		
Day 7	0	-	0	0	0	0	0	0	0	0		
1-2 hr	NOT ASSESSED			0	0	1	1	1	6	6		
Day 1	0	-	0	0	0	0	0	0	0	0		
Day 2	0	-	0	0	0	0	0	0	0	0		
Day 3	0	-	0	0	0	0	0	0	0	0		
Day 4	0	-	0	0	0	0	0	0	0	0		
Day 7	0	-	0	0	0	0	0	0	0	0		

- not relevant

APPENDIX A

COMPOSITION OF OAKES RAT DIET WITH EXTRA VITAMIN E

	<u>%</u>
Finely ground barley	26.34
Maize meal	9.11
Bran	18.08
Sussex ground oats	18.30
White fishmeal (crude protein 66%)	4.46
Yeast	1.34
Dried skimmed milk (crude protein 33%)	13.17
Fine meat and bone meal (crude protein 50%)	8.71
Salt	0.45
'Nuclo' P No 7 + B ₂	0.04
+ Vit E (60 mg/kg)	

APPENDIX B - COMPOSITION OF DIXON'S RGP GUINEA PIG DIET

Crude Oil	%	3.56	Tryptophan	%	0.20
Crude Protein	%	17.91	Glycine	%	0.98
Crude Fibre	%	7.58	Histidine	%	0.34
Digestible Crude Oil	%	2.58	Threonine	%	0.50
Digestible Crude Protein	%	13.67	Isoleucine	%	0.71
Digestible Crude Fibre	%	4.44	Leucine	%	1.02
Digestible Carbohydrate	%	42.69	Phenylalanine	%	0.70
Gross Energy	Cals/kg	3,961	Valine	%	0.77
Metabolizable Energy	Cals/kg	3,565	Tyrosine	%	0.43
Saturated Fatty Acids	%	0.67	Aspartic Acid	%	1.07
Linoleic Acid	%	1.20	Glutamic Acid	%	2.71
Other Unsaturated Acids	%	1.71	Proline	%	0.91
Calcium	%	1.04	Serine	%	0.65
Phosphorus	%	0.85	Vitamin A	IU/kg	64,756
Sodium Chloride	%	0.73	Vitamin D3	IU/kg	2,363
Magnesium	%	0.25	Carotene	mg/kg	36.93
Potassium	%	1.06	Vitamin B1 (Thiamine)	mg/kg	7.45
Sulphur	%	0.35	Vitamin B2 (Riboflavin)	mg/kg	12.41
Iron	mg/kg	273	Vitamin B6 (Pyridoxin)	mg/kg	3.89
Copper	mg/kg	28	Vitamin B12	µg/kg	20.92
Manganese	mg/kg	91	Vitamin C	mg/kg	1,311
Cobalt	µg/kg	1,002	Vitamin E	mg/kg	69.22
Zinc	mg/kg	19	Vitamin K	mg/kg	54.00
Iodine	µg/kg	2,821	Folic Acid	mg/kg	3.54
Arginine	%	0.99	Nicotinic Acid	mg/kg	101.46
Lysine	%	0.75	Pantothenic Acid	mg/kg	19.22
Methionine	%	0.31	Choline Chloride	gm/kg	1.43
Cystine	%	0.27	Biotin	mg/kg	0.26

APPENDIX C

COMPOSITION OF SPRATT'S PELLETISED RABBIT DIET

(The vitamin and trace mineral composition refers to the amounts of each nutrient added to the diet and ignores the natural sources).

Chemical Analysis

Moisture%	12
Ether extract%	2.6
Crude protein%	16.8
Crude fibre%	14.0
Total Digestible Nutrients%	49

Vitamin and Mineral Analysis

Lysine%	0.78
Methionine%	ND
Calcium%	1.0
Phosphorus%	0.6
Vitamin A iu/kg	6500
Vitamin D ₃ iu/kg	1000
Alphatocopherol iu/kg	4.5
Vitamin K ₃ mg/kg	0.6
Riboflavin mg/kg	3.5
Pantothenic Acid mg/kg	6
Nicotinic Acid mg/kg	6
Folic Acid mg/kg	0.2
Manganese mg/kg	10
Iron mg/kg	50
Iodine mg/kg	1
Copper mg/kg	6
Zinc mg/kg	30
Cobalt mg/kg	1

CIRCULATION

Internal

- 1 Bureau (Reference Copy)
- 2 Dr A A B Swan
- 3 Dr D M Conning)
Miss A Waring) on circulation
- 4 Dr M H Litchfield
- 5-6 Author(s)
- 7-10 Spares (4)

External

- 11 Dr K S Williamson, Principal Medical Officer
- 12 Dr J K Howard, Jealott's Hill Research Station
- 13-16 Jealott's Hill Reports Centre (4)
- 17 Fernhurst Reports Centre
- 18-29 Registration & Technical Literature Section (2 + 10 spa
- 30 Mr J Landy, ICI Australia Ltd, Merrindale
- 31 Chief Medical Officer, ICI Australia Ltd, Melbourne
- 32. ICI Tasman Vaccine Ltd, New Zealand
- 33 Dr R A Herrett, ICI US Inc
- 34 Mr A Milbauer, ICI US Inc

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