

技術レポート

7 共通試料による飼料中の農薬の一斉分析法の共同試験

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Collaborative Study of Pesticides in Feed by GC-MS

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A collaborative study was conducted with a formula feed and alfalfa spiked with 167 kinds of pesticide at 100 µg/kg was conducted in 9 laboratories. The repeatability and reproducibility as the relative standard deviation (RSD_r and RSD_R) of formula feed were 2.5%~34% and 6.8%~120% respectively, as for alfalfa these were 2.6%~48% and 6.0%~130% respectively. Number of pesticides was 137, of which mean recoveries were in the range of 50~200% and HorRat were within 2.0.

Key words: 残留農薬 pesticide residue ; 穀類 grain ; 乾牧草 grass hay ; 共同試験 collaborative study

1 緒 言

食品中の農薬等の残留規制の強化に伴い、農林水産省では、飼料原料に用いられている農薬を中心に 60 種類の農薬について、飼料安全法に基づいて残留基準値を設定したところである¹⁾。

そのため、当センターにおいて、飼料中の残留農薬のガスクロマトグラフ質量分析計による一斉分析法²⁾を開発したところであるが、更に今回、共通試料を用いた共同試験を行ったので、その結果を報告する。

2 試 料

市販の成鶏飼育用配合飼料及び乾牧草（アルファルファ）をそれぞれ 1 mm の網ふるいを通過するまで粉碎し、供試試料とした。なお、試験に用いた成鶏飼育用配合飼料の配合割合を Table 1 に示した。

Table 1 Component of formula feed used in this collaborative study

Kind of formula feed	Classification of ingredient	Ratio (%)	Ingredient
Formula feed for layer	Grains	70	Corn
	Oil meals	13	Soybean meal
	Animal by product	7	Fish meal
	Others	3	Calcium carbonate, Alfalfa meal, Calcium phosphate, Salt

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3 実験方法

3.1 定量方法

Table 2 の 163 成分を測定対象とし、各試料について 2 点併行分析を行った。分析方法は Scheme のとおり行った。

なお、各農薬の定量値は、 $\mu\text{g}/\text{kg}$ 単位で小数点以下第 2 位を四捨五入し、小数点以下第 1 位とした。

3.2 試験成績の統計処理

各試験室から報告された各農薬の測定値を AOAC の統計マニュアル²⁾に準拠し、次のとおり解析した。

各農薬成分の試験成績において、各試験室における検出下限未満又は検出不能 (N.D.) を含む成分の試験成績は、はずれ値の検定以前に除外し、各試験室の各成分の試験成績から Cochran 及び Grubbs の検定によってはずれ値を更に除外した後、各成分の平均値、試験室内繰返し精度及び試験室間再現精度を求めた。

4 分析実施試験室

株式会社島津製作所東京カスタマーサポートセンター、横河アナリティカルシステムズ株式会社アプリケーションセンター、全国酪農業協同組合連合会分析センター、名古屋市衛生研究所、社団法人日本科学飼料協会科学飼料研究センター、財団法人マイコトキシン検査協会、財団法人日本食品分析センター多摩研究所、独立行政法人肥飼料検査所（現（独）農林水産消費安全技術センター）本部及び同福岡事務所（現 同福岡センター）（9 試験室）

5 結果及び考察

9 試験室から報告があり、試験成績及びその統計処理の結果は、Table 3~4 のとおり、解析した農薬の試験室内繰返し精度及び試験室間再現精度は相対標準偏差 (RSD_f 及び RSD_R) として 2.5~48% 及び 6.0~130% であり、HorRat は 0.27~5.8 であった。

この解析の結果、平均回収率が 50%~200% であり、なおかつ HorRat が 2.0 以下の農薬は 137 種あり、これらの農薬について本法が適用できると考えられた。

なお、参考のため、各試験室で使用したガスクロマトグラフ質量分析計の機種等を Table 5 に示した。

Table 2 Pesticide list

No.	Japanese pesticide name	Pesticide name	CAS-No.
1	α -BHC	α -BHC	319-84-6
2	β -BHC	β -BHC	319-85-7
3	γ -BHC	γ -BHC	58-89-9
4	δ -BHC	δ -BHC	319-86-8
5	<i>o,p'</i> -DDD	<i>o,p'</i> -DDD	53-19-0
6	<i>p,p'</i> -DDD	<i>p,p'</i> -DDD	72-54-8
7	<i>o,p'</i> -DDE	<i>o,p'</i> -DDE	3424-82-6
8	<i>p,p'</i> -DDE	<i>p,p'</i> -DDE	72-55-9
9	<i>o,p'</i> -DDT	<i>o,p'</i> -DDT	789-02-6
10	<i>p,p'</i> -DDT	<i>p,p'</i> -DDT	50-29-3
11	EPN	EPN	2104-64-5
12	アクリナトリン	acrinathrin	101007-06-1
13	アザメチホス	azamethiphos	35575-96-3
14	アジンホスメチル	azinphos-methyl	86-50-0
15	アセトクロール	acetochlor	34256-82-1
16	アトラジン	atrazine	1912-24-9
17	アニロホス	anilofos	64249-01-0
18	アメトリン	ametryn	834-12-8
19	アラクロール	alachlor	15972-60-8
20	アリドクロール	allidochlor	93-71-0
21	アルドリン	aldrin	309-00-2
22	アレスリン	allethrin	584-79-2
23	イサゾホス	isazofos	42509-80-8
24	イソフェンホス	isofenphos	25311-71-1
25	イソプロチオラン	isoprothiolane	50512-35-1
26	イプロベンホス	iprobefos	26087-47-8
27	イマザメタベンズメチルエステル	imazamethabenz methyl ester	81405-85-8
28	エタルフルラリン	ethalfluralin	55283-68-6
29	エチオン	ethion	563-12-2
30	エディフェンホス	edifenphos	17109-49-8
31	エトフェンブロックス	etofenprox	80844-07-1
32	エトフメセート	ethofumesate	26225-79-6
33	エトプロホス	ethoprophos	13194-48-4
34	エトリジアゾール	etridiazole	2593-15-9
35	エトリムホス	etrimfos	38260-54-7
36	エンドリン	endrin	72-20-8
37	オキサジアゾン	oxadiazon	19666-30-9
38	オキサジキシル	oxadixyl	77732-09-3
39	カズサホス	cadusafos	95465-99-9
40	カルフェントラゾンエチル	carfentrazone-ethyl	128639-02-1
41	キノキシフェン	quinoxifen	124495-18-7
42	キノクラミン	quinochloramine	2797-51-5
43	キントゼン	quintozene	82-68-8
44	クマホス	coumaphos	56-72-4
45	クレソキシムメチル	kresoxim-methyl	143390-89-0
46	クロルタールジメチル	chlorthal-dimethyl	1861-32-1
47	オキシクロルデン	oxychlordan	26880-48-8
48	<i>cis</i> -クロルデン	<i>cis</i> -chlordan	5103-71-9
49	<i>trans</i> -クロルデン	<i>trans</i> -chlordan	5103-74-2
50	クロルピリホス	chlorpyrifos	2921-88-2
51	クロルピリホスメチル	chlorpyrifos-methyl	5598-13-0
52	クロルフェナピル	chlorfenapyr	122453-73-0
53	クロルフェンビンホス (E体)	(E)-chlorfenvinphos	18708-86-6
54	クロルフェンビンホス (Z体)	(Z)-chlorfenvinphos	18708-87-7

Table 2 (continued)

No.	Japanese pesticide name	Pesticide name	CAS-No.
55	クロルプロファム	chlorpropham	101-21-3
56	クロルベンジレート	chlorobenzilate	510-15-6
57	シアノホス	cyanophos	2636-26-2
58	ジクロホップメチル	diclofop-methyl	51338-27-3
59	ジクロラン	dicloran	99-30-9
60	ジクロルボス	dichlorvos	62-73-7
61	シハロトリン	cyhalothrin	68085-85-8
62	ジフェナミド	diphenamid	957-51-7
63	ジフェノコナゾール	difenoconazole	119446-68-3
64	シフルトリン	cyfluthrin	68359-37-5
65	シプロコナゾール	cyproconazole	113096-99-4
66	シペルメトリン	cypermethrin	52315-07-8
67	ジメタメトリン	dimethametryn	22936-75-0
68	ジメテナミド	dimethenamid	87674-68-8
69	ジメトエート	dimethoate	60-51-5
70	ジメピペレート	dimepiperate	61432-55-1
71	シラフルオフエン	silafiuofen	105024-66-6
72	ターバシル	terbacil	5902-51-2
73	ダイアジノン	diazinon	333-41-5
74	チオベンカルブ	thiobencarb	28249-77-6
75	ディルドリン	dieldrin	60-57-1
76	テクナゼン	tecnazene	117-18-0
77	テトラクロルビンホス	tetrachlorvinphos	22248-79-9
78	テトラコナゾール	tetraconazole	112281-77-3
79	テトラジホン	tetradifon	116-29-0
80	テブコナゾール	tebuconazole	107534-96-3
81	テブフェンピラド	tebufenpyrad	119168-77-3
82	テフルトリン	tefluthrin	79538-32-2
83	デルタメトリン	deltamethrin	52918-63-5
84	テルブトリン	terbutryn	886-50-0
85	テルブホス	terbufos	13071-79-9
86	トリアジメノール	triadimenol	55219-65-3
87	トリアジメホン	triadimefon	43121-43-3
88	トリアレート	tri-allate	2303-17-5
89	トリフルラリン	trifluralin	0582-09-8
90	トリフロキシストロビン	trifloxystrobin	141517-21-7
91	トリルフルアニド	tolyfluanid	731-27-1
92	ナプロパミド	napropamide	15299-99-7
93	ニトロタルイソプロピル	nitrothal-isopropyl	10552-74-6
94	パラチオン	parathion	56-38-2
95	パラチオンメチル	parathion-methyl	298-00-0
96	ハルフェンブロックス	halfenprox	111872-58-3
97	ピコリナフェン	picolinafen	137641-05-5
98	ビフェントリン	bifenthrin	82657-04-3
99	ピペロホス	piperophos	24151-93-7
100	ピラクロホス	pyraclofos	89784-60-1
101	ピリダフェンチオン	pyridaphenthion	119-12-0
102	ピリダベン	pyridaben	96489-71-3
103	ピリプロキシフェン	pyriproxyfen	95737-68-1
104	ピリミホスメチル	pirimiphos-methyl	29232-93-7
105	ビンクロゾリン	vinclozolin	50471-44-8
106	フィプロニル	fipronil	120068-37-3
107	フェナリモル	fenarimol	60168-88-9
108	フェニトロチオン	fenitrothion	122-14-5

Table 2 (continued)

No.	Japanese pesticide name	Pesticide name	CAS-No.
109	フェノチオカルブ	fenothiocarb	62850-32-2
110	フェノトリン	phenothrin	26002-80-2
111	フェンチオン	fenthion	55-38-9
112	フェントエート	phenthoate	2597/3/7
113	フェンバレレート	fenvalerate	51630-58-1
114	フェンブコナゾール	fenbuconazole	114369-43-6
115	フェンプロバトリン	fenpropathrin	39515-41-8
116	フェンプロピモルフ	fenpropimorph	67306-03-0
117	ブタミホス	butamifos	36335-67-8
118	ブピリメート	bupirimate	41483-43-6
119	フラムプロップメチル	flamprop-methyl	52756-25-9
120	フルジオキシソニル	fludioxonil	131341-86-1
121	フルシトリネート	flucythrinate	71611-31-9
122	フルトラニル	flutolanil	66332-96-5
123	フルトリアホール	flutriafol	76674-21-0
124	フルバリネート	fluvalinate	69409-94-5
125	フルミオキサジン	flumioxazin	103361-09-7
126	フルミクロラックペンチル	flumiclorac pentyl	87546-18-7
127	プロシミドン	procymidone	32809-16-8
128	プロパクロール	propachlor	1918-16-7
129	プロバジン	propazine	139-40-2
130	プロパニル	propanil	709-98-8
131	プロパルギット	propargite	2312-35-8
132	プロピコナゾール	propiconazole	60207-90-1
133	プロファム	propham	122-42-9
134	プロフェノホス	profenofos	41198-08-7
135	プロペタンホス	propetamphos	31218-83-4
136	ブロマシル	bromacil	314-40-9
137	プロメトリン	prometryn	7287-19-6
138	ブロモブチド	bromobutide	74712-19-9
139	ブロモプロピレート	bromopropylate	18181-80-1
140	ブロモホス	bromophos	2104-96-3
141	ヘキサコナゾール	hexaconazole	79983-71-4
142	ヘキサジノン	hexazinone	51235-04-2
143	ベノキサコール	benoxacor	98730-04-2
144	ヘプタクロール	heptachlor	76-44-8
145	ヘプタクロールエポキシド	heptachlor epoxide	1024-57-3
146	<i>cis</i> -ペルメトリン	<i>cis</i> -permethrin	61949-76-6
147	<i>trans</i> -ペルメトリン	<i>trans</i> -permethrin	61949-77-7
148	ペンコナゾール	penconazole	66246-88-6
149	ペンディメタリン	pendimethalin	40487-42-1
150	ベンフルラリン	benfluralin	1861-40-1
151	ホサロン	phosalone	2310-17-0
152	ホスチアゼート	fosthiazate	98886-44-3
153	ホスファミドン	phosphamidon	13171-21-6
154	ホスメット	phosmet	732-11-6
155	ホレート	phorate	298-02-2
156	マラチオン	malathion	121-75-5
157	メタクリホス	methacrifos	30864-28-9
158	メタラキシル	metalaxyl	57837-19-1
159	メチダチオン	methidathion	950-37-8
160	メトキシクロール	methoxychlor	72-43-5
161	メトミノストロビン (<i>E</i> 体)	(<i>E</i>)-metominostrobin	133408-50-1
162	メトラクロール	metolachlor	51218-45-2
163	メビンホス	mevinphos	7786-34-7

Sample (grass hay; 5.0 g, others; 10.0 g)

- add 15 mL of water
- allow to stand 30 minutes
- add 100 mL acetonitrile
- shake for 30 minutes
- filter under suction filter (No.5B)
- wash with 50 mL of acetonitrile

Filtrate

- evaporate to the volume of 15 mL under 40°C

Chem Elut cartridge

- apply sample solution, and washed with 5 mL of water
- stand for 5 minutes
- wash with 100 mL of hexane-ethyl acetate (1:1)

Hexane-ethyl acetate solution

- add 1 mL of diethylene glycol-acetone (1:49)
- evaporate to dryness under 40°C
- dissolve in 10 mL of cyclohexane-acetone (4:1)
- filter with membrane filter (0.5 μm)

GPC

- apply 5 mL of sample solution
- collect 60~150 mL fraction
- add a drop of diethylene glycol-acetone (1:49)
- evaporate to dryness under 40°C
- dissolve in 2 mL of ethyl acetate

ENVI-Carb/NH₂ cartridge (prewash with 10 mL of ethyl acetate)

- apply sample solution
- elute with 8 mL of ethyl acetate
- add a drop of diethylene glycol-acetone (1:49)
- evaporate to dryness under 40°C
- dissolve in hexane-acetone (7:3) (grass hay; 5.0 mL, others; 10.0 mL)

Sep-Pak Plus Florisil cartridge (prewash with 5 mL of acetone and 5 mL hexane)

- apply 4.0 mL of sample solution
- elute with 6 mL of hexane-acetone (7:3)

Elute

- add a drop of diethylene glycol-acetone (1:49)
- evaporate to dryness under 40°C
- dissolve in 2.0 mL of 2,2,4-trimethylpentane-acetone (4:1)

GC-MS

Scheme Analytical procedure for pesticide in feeds by using GC-MS

Table 3 (1) Collaborative study results for determination of pesticides in formula feed and alfalfa

No.	Pesticide name	Formula feed					Alfalfa				
		Recovery(%)	RSD _r %	RSD _R %	HorRat	n=	Recovery(%)	RSD _r %	RSD _R %	HorRat	n=
1	acetochlor	106.5	4.6	26	1.2	9	114.9	5.5	7.7	0.35	7
2	acrinathrin	114.9	6.7	49	2.2	9	105.1	8.8	29	1.3	9
3	alachlor	97.9	4.7	20	0.92	9	112.2	4.6	6.2	0.28	8
4	aldrin	86.6	8.9	27	1.2	9	82.9	4.8	19	0.88	9
5	allethrin	90.9	14	28	1.3	8	111.1	9.8	28	1.3	8
6	allidochlor	101.9	2.5	21	0.95	7	110.7	16	27	1.2	8
7	ametryn	59.9	16	38	1.7	6	88.5	11	19	0.84	8
8	anilofos	131.9	5.2	26	1.2	8	140.3	4.7	18	0.82	8
9	atrazine	87.6	9.5	28	1.3	9	109.0	6.6	7.7	0.35	7
10	azamethiphos	137.1	27	62	2.8	5	206.0	6.5	51	2.3	5
11	azinphos-methyl	154.9	8.2	67	3.1	9	134.8	24	46	2.1	8
12	benfluralin	91.4	8.1	33	1.5	9	102.5	6.9	18	0.81	9
13	benoxacor	106.4	7.5	22	1.0	9	126.7	8.2	32	1.5	9
14	α -BHC	89.7	5.2	19	0.85	9	103.1	4.4	10	0.45	9
15	β -BHC	90.5	5.1	23	1.0	9	96.1	4.2	22	1.0	9
16	γ -BHC	92.6	5.7	25	1.1	9	77.7	6.3	32	1.5	8
17	δ -BHC	89.3	5.2	21	1.0	9	102.7	6.4	10	0.47	8
18	bifenthrin	97.2	6.2	11	0.51	8	101.5	5.9	20	0.92	9
19	bromacil	65.9	20	78	3.5	6	145.0	7.4	33	1.5	8
20	bromobutide	100.7	4.2	19	0.86	8	113.5	3.9	7.6	0.35	8
21	bromophos	94.4	5.7	22	1.0	9	93.2	4.7	18	0.83	8
22	bromopropylate	107.7	3.7	22	1.0	8	113.4	4.2	19	0.84	8
23	bupirimate	72.3	3.6	82	3.7	6	111.9	7.1	8.5	0.39	8
24	butamifos	121.6	7.6	43	2.0	8	137.5	7.3	18	0.80	9
25	cadusafos	107.0	8.9	22	1.0	9	165.8	7.6	34	1.5	9
26	carfentrazone-ethyl	97.6	5.4	23	1.1	8	127.9	6.5	15	0.70	9
27	chlorbenzilate	114.7	3.8	23	1.0	9	113.0	4.7	17	0.79	8
28	<i>cis</i> -chlordane	82.3	6.3	34	1.5	9	92.9	4.8	9.3	0.42	7
29	oxychlordane	81.4	8.8	38	1.7	9	91.1	4.6	10	0.46	7
30	<i>trans</i> -chlordane	98.2	6.1	12	0.52	7	86.8	6.9	27	1.2	9
31	chlorfenapyr	97.5	6.1	13	0.60	9	102.2	4.4	16	0.73	9
32	(<i>E</i>)-chlorfenvinphos	102.5	6.5	25	1.1	9	121.9	6.0	9.3	0.42	9
33	(<i>Z</i>)-chlorfenvinphos	100.2	6.9	23	1.0	9	121.5	5.3	10	0.46	9
34	chlorpropham	106.6	6.1	16	0.73	9	122.0	4.3	16	0.73	9
35	chlorpyrifos	104.2	8.8	33	1.5	9	93.4	4.8	22	1.0	8
36	chlorpyrifos-methyl	100.6	7.4	8.3	0.38	7	93.3	5.0	20	0.90	8
37	chlorthal-dimethyl	88.2	5.9	24	1.1	9	97.3	4.9	19	0.87	9
38	coumaphos	81.6	5.3	81	3.7	8	22.8	48	120	5.3	5
39	cyanophos	109.5	6.5	6.8	0.31	7	291.3	9.6	97	4.4	9
40	cyfluthrin	134.3	7.3	42	1.9	8	183.1	20	70	3.2	9
41	cyhalothrin	129.5	7.8	31	1.4	9	108.5	6.5	22	1.0	7
42	cypermethrin	144.6	24	32	1.5	8	285.3	17	52	2.4	7
43	cyproconazole	60.5	20	74	3.3	7	118.7	11	19	0.88	9
44	<i>o.p'</i> -DDD	86.0	12	21	0.93	7	91.8	4.9	17	0.77	9
45	<i>p.p'</i> -DDD	102.1	4.9	20	0.91	8	102.7	5.3	17	0.76	9
46	<i>o.p'</i> -DDE	93.6	6.6	10	0.45	7	93.1	4.5	9.7	0.44	8
47	<i>p.p'</i> -DDE	92.3	7.6	9.3	0.42	7	87.1	5.6	19	0.86	9
48	<i>o.p'</i> -DDT	111.7	7.1	30	1.4	9	104.4	6.9	24	1.1	9
49	<i>p.p'</i> -DDT	105.7	7.8	24	1.1	9	98.9	4.9	24	1.1	7
50	deltamethrin	121.5	7.7	42	1.9	9	123.6	12	29	1.3	9
51	diazinon	98.9	5.2	19	0.86	9	125.8	4.1	7.8	0.35	7
52	dichlorvos	34.5	14	54	2.4	7	9.6	22	42	1.9	4
53	diclofop-methyl	99.3	6.8	19	0.88	9	114.2	4.8	17	0.75	8
54	dicloran	98.6	12	26	1.2	9	119.0	7.4	22	1.0	9
55	dieldrin	81.1	8.5	29	1.3	8	95.4	5.3	9.2	0.42	8
56	difenoconazole	112.8	7.6	27	1.2	9	144.8	14	24	1.1	9
57	dimepiperate	113.3	6.1	18	0.83	9	135.9	7.4	21	1.0	9
58	dimethametryn	36.3	6.2	120	5.3	5	99.4	9.2	27	1.2	8

RSD_r%: Relative standard deviation of repeatability within same laboratory

RSD_R%: Relative standard deviation of reproducibility between different laboratories

■: Recovery was out of the range of 50~200% or HorRat was over 2.0.

□: HorRat was within the range of 1.5~2.0.

Table 3 (2) Collaborative study results for determination of pesticides in formula feed and alfalfa

No.	Pesticide name	Formula feed					Alfalfa				
		Recovery(%)	RSD _r %	RSD _R %	HorRat	n=	Recovery(%)	RSD _r %	RSD _R %	HorRat	n=
59	dimethenamid	97.3	4.5	19	0.84	9	114.1	4.7	6.0	0.27	8
60	dimethoate	112.9	14	33	1.5	9	129.0	21	20	0.93	6
61	diphenamid	97.8	3.4	20	0.92	9	114.2	3.8	10	0.47	8
62	ediphenphos	140.0	13	39	1.8	8	163.8	5.8	14	0.65	7
63	endrin	110.5	7.2	22	1.0	9	129.9	5.6	38	1.7	8
64	EPN	131.9	5.1	37	1.7	9	121.1	5.0	30	1.4	7
65	ethalfuralin	93.1	9.5	31	1.4	9	96.6	8.4	24	1.1	9
66	ethion	117.4	5.7	28	1.3	9	111.5	4.9	25	1.1	8
67	ethofumesate	102.3	4.6	31	1.4	8	107.4	3.7	8.6	0.39	8
68	ethoprophos	105.4	8.5	22	1.0	9	121.8	5.7	8.0	0.36	7
69	etofenprox	113.5	6.9	27	1.2	9	109.9	5.7	25	1.1	8
70	etridiazole	99.1	4.6	31	1.4	8	99.4	20	40	1.8	9
71	etrimphos	105.2	6.8	7.7	0.35	7	107.8	5.8	6.7	0.30	7
72	fenarimol	110.6	4.5	9.2	0.42	8	135.4	7.3	16	0.71	9
73	fenbuconazole	96.5	7.0	14	0.64	8	123.8	12	33	1.5	9
74	fenitrothion	126.7	8.7	42	1.9	9	134.9	7.8	33	1.5	9
75	fenothiocarb	108.4	5.0	14	0.63	9	117.8	6.3	13	0.61	9
76	fenpropathrin	105.6	5.6	22	1.0	8	114.2	13	34	1.5	8
77	fenpropimorph	81.1	5.5	44	2.0	9	108.1	9.4	15	0.68	7
78	fenthion	75.4	3.2	30	1.4	9	78.9	14	29	1.3	9
79	fenvalerate	128.9	9.3	35	1.6	9	123.9	13	20	0.93	8
80	fipronil	98.7	11	37	1.7	8	120.0	5.5	15	0.69	9
81	flamprop-methyl	94.1	4.1	38	1.7	8	113.3	3.5	7.8	0.35	7
82	flucythrinate	132.3	6.6	27	1.2	9	152.1	11	29	1.3	9
83	fludioxonil	147.9	34	70	3.2	7	94.7	6.3	22	1.0	8
84	flumiclorac pentyl	120.2	5.3	21	1.0	7	125.9	4.5	12	0.55	7
85	flumioxazin	134.3	10	44	2.0	9	147.7	5.2	22	1.0	8
86	flutolanil	83.9	8.1	27	1.2	8	120.8	4.5	24	1.1	8
87	flutriafol	70.4	19	37	1.7	4	73.4	20	29	1.3	6
88	fluvalinate	126.4	7.7	33	1.5	9	136.4	10	29	1.3	9
89	fosthiazate	137.3	11	37	1.7	9	182.0	6.1	14	0.65	9
90	halfenprox	108.4	7.4	20	0.91	8	113.9	6.5	35	1.6	8
91	heptachlor	87.8	6.3	35	1.6	9	93.1	9.9	23	1.1	9
92	heptachlor-epoxyde	82.6	5.9	30	1.3	9	87.9	5.6	21	1.0	9
93	hexaconazole	78.7	12	21	0.93	7	126.0	6.7	17	0.78	8
94	hexazinone	32.1	13	120	5.3	8	35.0	9.5	67	3.0	8
95	imazamethabenz methyl ester	64.9	6.8	38	1.7	6	88.1	8.2	55	2.5	9
96	iprobenfos	124.4	12	28	1.3	9	132.2	4.6	13	0.61	8
97	isazofos	109.9	7.8	21	1.0	9	131.4	6.8	26	1.2	9
98	isofenphos	93.8	8.7	22	1.0	8	105.5	9.2	24	1.1	9
99	isoprothiolane	99.5	6.5	33	1.5	8	118.6	5.0	7.7	0.35	7
100	kresoxim-methyl	107.2	4.0	21	1.0	9	113.8	4.9	9.1	0.41	7
101	malathion	108.0	4.9	24	1.1	8	113.6	6.2	19	0.87	8
102	metalaxyl	39.9	24	55	2.5	9	58.5	12	87	4.0	8
103	methacrifos	94.4	5.0	21	0.94	9	101.9	6.6	20	0.91	9
104	methidathion	115.3	12	19	0.87	8	158.7	12	29	1.3	8
105	methoxychlor	107.7	6.3	24	1.1	9	122.0	8.7	30	1.3	9
106	metolachlor	100.6	3.1	21	1.0	9	109.4	5.3	22	1.0	9
107	(E)-metominostrobin	98.3	6.5	29	1.3	7	126.4	6.3	15	0.69	9
108	mevinphos	83.5	11	41	1.9	9	60.8	10	27	1.2	9
109	napropamide	103.6	6.1	17	0.75	7	124.3	6.5	15	0.67	9
110	nitrothal-isopropyl	106.6	10	45	2.0	9	111.8	8.4	34	1.6	9
111	oxadiazon	93.6	5.7	18	0.80	7	96.3	2.6	16	0.71	8
112	oxadixyl	53.2	26	67	3.0	7	42.4	42	130	5.8	5
113	parathion	120.6	9.7	34	1.5	9	133.6	8.9	7.5	0.34	7
114	parathion-methyl	114.5	12	34	1.6	9	130.8	7.5	26	1.2	9
115	penconazole	92.0	3.9	20	0.92	8	110.8	6.2	22	1.0	9
116	pendimethalin	107.3	8.1	39	1.8	9	112.7	8.3	28	1.3	9

RSD_r%: Relative standard deviation of repeatability within same laboratory

RSD_R%: Relative standard deviation of reproducibility between different laboratories

■: Recovery was out of the range of 50~200% or HorRat was over 2.0.

□: HorRat was within the range of 1.5~2.0.

Table 3 (3) Collaborative study results for determination of pesticides in formula feed and alfalfa

No.	Pesticide name	Formula feed					Alfalfa				
		Recovery(%)	RSD _r %	RSD _R %	HorRat	n=	Recovery(%)	RSD _r %	RSD _R %	HorRat	n=
117	<i>cis</i> -permethrin	99.8	5.5	15	0.67	8	104.0	6.9	11	0.51	8
118	<i>trans</i> -permethrin	106.9	3.5	24	1.1	9	111.0	5.2	18	0.83	9
119	phenothrin	93.0	5.5	20	0.92	7	103.1	7.1	26	1.2	8
120	phenthoate	92.3	4.0	27	1.2	8	103.9	6.4	11	0.48	7
121	phorate	80.1	8.0	30	1.4	9	86.2	12	34	1.5	9
122	phosalone	124.6	7.3	14	0.62	7	131.4	6.7	21	1.0	8
123	phosmet	119.6	4.4	26	1.2	8	131.6	6.4	22	1.0	8
124	phosphamidon	55.5	18	50	2.3	9	58.7	16	53	2.4	8
125	picolinafen	62.1	11	75	3.4	9	22.3	36	110	4.9	7
126	piperophos	163.0	7.1	38	1.7	9	179.6	5.4	30	1.4	9
127	pirimiphos-methyl	99.0	4.7	23	1.1	9	112.2	5.0	8.1	0.37	8
128	procymidone	99.4	5.6	8.8	0.40	8	106.1	4.5	8.5	0.39	8
129	profenofos	94.0	12	33	1.5	8	119.0	6.2	15	0.68	8
130	prometryn	72.0	19	47	2.1	5	93.9	7.2	9.0	0.41	4
131	propachlor	101.6	4.3	18	0.83	9	125.5	5.0	8.9	0.40	8
132	propanil	107.8	6.4	20	0.93	9	122.6	6.1	6.6	0.30	7
133	propargite	111.5	9.2	15	0.69	8	111.2	11	20	0.93	8
134	propazine	83.0	7.1	28	1.3	9	103.8	4.8	27	1.2	9
135	propetamphos	98.5	7.4	24	1.1	9	115.0	6.7	36	1.6	8
136	propham	105.0	3.8	18	0.81	8	111.5	5.3	7.5	0.34	7
137	propiconazole	116.9	16	24	1.1	9	177.1	13	29	1.3	9
138	pyraclofos	125.1	7.5	56	2.5	9	66.7	36	69	3.1	7
139	pyridaben	101.4	3.5	15	0.70	8	125.7	5.3	23	1.0	9
140	pyridaphenthion	135.2	5.3	34	1.5	8	137.2	4.7	24	1.1	8
141	pyriproxyfen	110.8	6.6	17	0.77	9	124.2	5.4	19	0.86	9
142	quinochloramine	51.1	14	75	3.4	8	15.0	13	71	3.2	5
143	quinoxifen	39.4	17	75	3.4	8	26.6	29	87	4.0	8
144	quintozene	82.0	7.9	43	2.0	8	71.5	10	31	1.4	8
145	silafuofen	103.7	7.0	23	1.1	9	106.5	6.2	19	0.87	9
146	tebuconazole	113.4	5.9	25	1.1	7	126.2	9.8	16	0.71	8
147	tebufenpyrad	111.0	4.6	18	0.84	9	118.2	4.8	14	0.63	9
148	tecnazene	91.4	6.3	10	0.47	7	91.9	10	25	1.1	9
149	tefluthrin	91.0	3.0	21	0.94	8	89.3	5.5	18	0.82	9
150	terbacil	133.2	8.4	23	1.1	8	172.3	3.2	8.9	0.40	6
151	terbufos	85.1	7.6	27	1.2	9	99.4	7.7	28	1.3	9
152	terbutryn	73.1	8.0	41	1.9	7	112.2	6.7	8.2	0.37	7
153	tetrachlorvinphos	116.8	3.4	22	1.0	8	123.0	5.4	17	0.78	8
154	tetraconazole	91.5	4.8	23	1.1	8	104.7	7.0	18	0.81	9
155	tetradifon	95.1	3.6	22	1.0	9	99.6	6.7	22	1.0	9
156	thiobencarb	100.8	13	27	1.2	9	110.1	5.2	18	0.80	9
157	tolylfluamid	94.2	6.2	28	1.3	9	59.8	9.4	35	1.6	9
158	triadimefon	101.6	6.5	19	0.88	8	123.4	6.7	18	0.80	9
159	triadimenol	155.9	7.1	82	3.7	5	148.4	8.1	31	1.4	7
160	tri-allate	90.3	4.6	19	0.87	9	95.1	4.6	17	0.79	9
161	trifloxystrobin	122.7	5.5	44	2.0	8	115.4	4.9	24	1.1	8
162	trifluralin	98.5	9.0	30	1.4	9	108.7	7.7	17	0.78	9
163	vinclozolin	97.3	5.3	24	1.1	9	105.0	4.9	6.1	0.28	7

RSD_r%: Relative standard deviation of repeatability within same laboratory

RSD_R%: Relative standard deviation of reproducibility between different laboratories

■: Recovery was out of the range of 50~200% or HorRat was over 2.0.

□: HorRat was within the range of 1.5~2.0.

Table 4-1 (1) Collaborative study (formula feed)

(µg/kg)								
Lab. No	acetochlor		acrinathrin		alachlor		aldrin	
1	104.8	105.8	59.3	60.6	105.5	106.4	90.2	102.7
2	109.2	105.0	103.7	104.5	106.1	103.1	47.6	61.9
3	99.1	110.0	97.3	117.9	97.2	112.9	119.8	100.3
4	152.7	160.2	221.2	237.8	116.1	124.3	103.5	109.4
5	87.9	83.7	67.4	79.7	77.1	82.5	73.1	78.4
6	121.0	130.0	44.7	50.6	75.5	74.1	92.5	81.0
7	106.5	113.9	161.7	164.5	113.0	110.2	91.1	95.7
8	103.1	112.5	131.6	134.2	115.9	112.5	113.8	102.8
9	55.2	56.1	108.9	121.7	62.9	66.7	47.7	47.1
Lab. No	allethrin		allidochlor		ametryn		anilofos	
1	97.0	88.6	115.0	120.1	2214.5 ³⁾	3800.0 ³⁾	103.9	112.9
2	94.5	90.0	112.1	108.0	34.8	37.7	141.5	137.5
3	81.0	94.0	73.0	71.3	51.1	73.5	123.2	142.1
4	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	131.2	133.6	94.6	103.5	197.6	205.6
5	84.2	69.1	87.3	89.1	57.6	67.8	100.9	105.9
6	104.7	117.8	107.2	110.9	58.0	39.9	183.8 ³⁾	237.6 ³⁾
7	130.5	139.7	81.3	86.0	54.3	46.5	144.9	140.6
8	50.2	94.8	91.1 ³⁾	110.8 ³⁾	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	125.6	137.6
9	57.6	60.2	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	98.3	92.0
Lab. No	atrazine		azamethiphos		azinphos-methyl		benfluralin	
1	102.4	105.6	90.5	70.7	110.2	110.8	88.1	93.7
2	138.2	120.2	1120.8 ³⁾	596.3 ³⁾	85.1	83.4	102.4	107.5
3	70.0	69.0	102.0	162.0	139.4	175.8	87.2	102.0
4	95.5	96.4	213.9	261.6	264.2	281.7	144.7	159.6
5	77.5	81.5	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	68.5	79.3	69.2	75.7
6	106.7	103.8	154.0	234.5	122.0	141.5	48.3	54.6
7	71.8	62.6	54.4	27.6	154.0	156.5	92.6	104.3
8	72.0	100.1	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	44.1	35.9	94.6	107.8
9	50.6	52.3	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	354.6	380.5	51.0	61.2
Lab. No	benoxacor		α -BHC		β -BHC		γ -BHC	
1	101.2	101.0	98.5	96.5	85.7	87.6	96.6	92.7
2	129.4	124.6	75.2	79.3	80.3	83.1	112.9	117.5
3	93.8	105.4	90.0	103.9	88.8	103.3	93.8	107.2
4	125.2	132.0	103.6	106.7	93.4	97.6	108.3	116.3
5	86.7	87.8	78.4	83.4	81.7	83.5	79.1	84.3
6	116.2	131.0	90.2	83.5	101.6	97.5	80.9	71.8
7	109.3	123.0	94.9	100.2	96.2	100.5	94.7	98.8
8	105.8	128.7	112.0	105.9	120.0	130.0	117.1	107.5
9	56.6	57.4	58.7	53.4	49.2	48.1	44.6	42.8

1) Not Detected

2) Without analysis

3) Data excluded by Cochran test

4) Data excluded by Grubbs test

Table 4-1 (2) Collaborative study (formula feed) (continued)

									($\mu\text{g}/\text{kg}$)
Lab. No	δ -BHC		bifenthrin		bromacil		bromobutide		
1	93.2	91.3	103.0	112.2	105.0	114.0	98.9	99.0	
2	80.0	84.8	97.9	98.4	653.1 ⁴⁾	624.8 ⁴⁾	94.3	95.9	
3	102.7	117.3	87.2	105.2	2.3	4.9	98.8	111.3	
4	102.8	106.1	143.7 ⁴⁾	152.9 ⁴⁾	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	121.1	129.3	
5	77.9	82.6	75.8	82.9	93.0	93.9	73.2	78.1	
6	87.8	79.9	105.7	100.4	102.9	146.6	73.2	73.8	
7	95.2	98.9	101.1	100.1	16.8	16.6	116.7	120.4	
8	107.4	101.4	111.6	102.8	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	115.9	111.0	
9	49.9	47.4	87.6	83.6	43.0	51.3	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	
Lab. No	bromophos		bromopropylate		bupirimate		butamifos		
1	91.0	91.8	104.7	112.3	102.4	99.5	99.6	111.8	
2	90.2	91.0	101.6	102.0	2.6	1.9	100.3	103.5	
3	101.9	116.3	98.7	110.2	92.3 ³⁾	59.6 ³⁾	86.5	105.3	
4	112.0	117.9	153.1	158.4	128.5 ³⁾	2.2 ³⁾	209.0	232.5	
5	66.3	70.8	97.0	98.8	89.9	93.1	73.8	83.3	
6	90.4	99.1	211.2 ³⁾	235.6 ³⁾	157.5	164.7	59.8	63.2	
7	105.8	115.1	113.7	111.9	15.1	12.6	158.3	172.5	
8	109.5	118.7	107.9	110.7	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	142.5	144.2	
9	57.0	55.2	73.2	68.6	65.2	63.2	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	
Lab. No	cadusafos		carfentrazone-ethyl		chlorbenzilate		<i>cis</i> -chlordane		
1	114.7	114.2	102.6	106.6	109.5	107.9	87.8	90.9	
2	107.4	105.0	93.3	96.3	113.4	108.7	23.3	31.5	
3	99.8	120.8	91.7 ³⁾	124.7 ³⁾	99.5	113.3	86.0	99.2	
4	123.4	125.7	139.6	150.0	136.1	144.0	113.2	121.1	
5	95.4	95.9	91.9	99.9	92.1	92.3	74.9	80.2	
6	135.5	152.8	96.6	94.4	161.2	168.1	93.8	82.8	
7	104.6	112.1	79.8	64.6	123.2	122.7	94.2	93.0	
8	86.6	114.9	74.0	72.2	114.0	110.5	102.8	107.0	
9	56.4	61.6	99.1	99.9	75.4	71.9	50.7	48.1	
Lab. No	oxychlordane		<i>trans</i> -chlordane		chlorfenapyr		<i>(E)</i> -chlorfenvinphos		
1	87.9	94.0	90.9	96.3	96.1	102.0	103.2	106.5	
2	15.8	21.0	22.9 ⁴⁾	32.4 ⁴⁾	91.0	90.6	87.3	93.9	
3	86.8	99.9	89.1	101.0	74.6	86.7	116.1	128.1	
4	107.7	119.9	104.7	112.1	115.7	124.9	144.6	150.5	
5	69.7	73.8	77.2	82.3	85.9	104.1	69.2	80.6	
6	82.1	78.6	107.2	93.0	101.6	102.4	58.8	69.9	
7	98.7	80.4	96.6	101.5	102.8	107.4	121.5	118.6	
8	120.0	119.3	109.5	113.7	103.5	100.6	95.1	112.2	
9	61.8	48.4	54.6 ⁴⁾	52.9 ⁴⁾	83.2	81.8	93.0	96.7	

1)~4) See Table 4-1 (1)

Table 4-1 (3) Collaborative study (formula feed) (continued)

(µg/kg)								
Lab. No	(Z)-chlorfenvinphos		chlorpropham		chlorpyrifos		chlorpyrifos-methyl	
1	101.5	103.3	108.1	119.0	77.7	79.2	89.8	93.5
2	93.4	96.3	116.0	116.5	103.4	100.8	97.8	98.6
3	114.3	127.9	106.5	123.3	101.3	113.3	92.3	104.7
4	134.6	145.1	118.9	129.7	106.9	109.7	104.8	110.2
5	74.3	83.6	87.5	94.2	69.8	71.8	73.4 ⁴⁾	76.5 ⁴⁾
6	63.2	73.6	84.8	95.2	124.7	144.6	88.4	105.7
7	114.3	115.3	117.0	123.3	100.3	102.9	108.8	112.9
8	88.6	104.9	110.7	114.8	157.1	187.8	92.3	108.3
9	80.2	89.8	74.0	79.4	63.6	60.7	50.8 ⁴⁾	50.2 ⁴⁾
Lab. No	chlorthal-dimethyl		coumaphos		cyanophos		cyfluthrin	
1	96.2	98.2	15.7	23.0	117.2	120.8	238.2	250.4
2	55.1	62.8	135.3	131.3	106.0	102.5	89.6	89.8
3	90.9	104.6	60.3 ³⁾	86.7 ³⁾	102.0	113.2	93.4	124.1
4	103.6	110.2	177.0	168.7	107.9	113.6	588.7 ³⁾	660.9 ³⁾
5	76.3	81.1	23.7	19.7	81.2 ⁴⁾	80.7 ⁴⁾	82.5	97.2
6	102.0	89.4	9.3	19.8	95.7	112.1	77.2	83.9
7	94.4	97.1	137.0	132.9	114.0	114.1	160.5	162.2
8	112.3	109.9	125.5	129.0	98.5	114.8	139.2	127.2
9	52.5	51.7	28.7	29.6	55.2 ⁴⁾	55.8 ⁴⁾	169.5	163.8
Lab. No	cyhalothrin		cypermethrin		cyproconazole		<i>o,p'</i> -DDD	
1	127.8	139.5	116.9	123.9	92.8	90.6	94.5	96.7
2	117.9	108.9	173.8	231.2	11.3	11.2	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾
3	85.3	111.4	56.0	146.7	121.6 ²⁾	N.D. ¹⁾²⁾	79.2	103.0
4	195.8	203.9	173.8	231.2	37.7	20.3	107.8	115.3
5	89.8	98.2	106.5	114.0	31.2	48.6	74.3	80.0
6	169.2	195.4	137.1	166.4	85.9	60.0	89.1	80.8
7	134.3	143.7	478.9 ⁴⁾	545.9 ⁴⁾	18.5	17.7	95.1	69.2
8	119.1	120.9	102.4	141.5	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾
9	86.8	82.7	163.2	129.3	142.7	116.9	61.0	58.4
Lab. No	<i>p,p'</i> -DDD		<i>o,p'</i> -DDE		<i>p,p'</i> -DDE		<i>o,p'</i> -DDT	
1	103.0	113.4	90.3	89.5	91.4	97.7	101.1	111.9
2	92.2	96.0	85.2	87.8	36.5 ⁴⁾	37.2 ⁴⁾	118.6	113.2
3	90.1 ³⁾	127.1 ³⁾	86.0	100.7	82.7	97.3	89.2	107.8
4	125.7	135.9	102.5	106.2	95.5	93.1	121.0	130.5
5	79.3	86.4	79.1	86.1	79.6	83.6	82.9	94.2
6	107.7	98.9	101.9	87.1	102.7	91.1	99.4	89.0
7	123.7	127.3	184.0 ⁴⁾	185.5 ⁴⁾	84.7	87.7	141.1	157.8
8	105.1	99.4	101.2	106.9	110.8	94.4	170.2	165.8
9	70.9	69.3	50.4 ⁴⁾	46.5 ⁴⁾	53.1 ⁴⁾	49.0 ⁴⁾	60.6	56.9

1)~4) See Table 4-1 (1)

Table 4-1 (4) Collaborative study (formula feed) (continued)

									($\mu\text{g}/\text{kg}$)
Lab. No	<i>p,p'</i> -DDT		deltamethrin		diazinon		dichlorvos		
1	93.8	105.2	76.5	90.4	111.4	109.8	11.4	3.0	
2	106.3	117.2	105.1	106.0	115.0	114.2	36.8	36.4	
3	86.7	92.1	87.1	106.7	100.5	116.2	25.2	35.6	
4	129.7	142.8	224.0	237.6	111.3	118.3	61.3	72.7	
5	82.4	88.4	81.8	91.4	83.0	91.7	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	
6	118.4	102.3	60.5	66.0	75.6	78.1	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	
7	105.3	111.4	141.1	147.6	103.3	109.4	28.5	30.1	
8	155.9	135.0	139.1	131.9	106.0	108.6	44.2	43.5	
9	66.4	62.9	134.6	159.1	60.1	67.1	27.2	27.7	
Lab. No	diclofop-methyl		dicloran		dieldrin		difenoconazole		
1	100.6	107.8	101.5	103.9	91.3	101.9	82.1	93.9	
2	83.0	89.7	103.0	109.4	47.3	48.6	107.0	102.4	
3	88.9	101.4	79.3	96.5	73.2	84.6	105.8	122.5	
4	134.9	144.0	143.1	153.9	113.4	120.4	181.0	179.0	
5	87.2	94.4	80.2	91.5	90.4	93.3	72.8	92.6	
6	121.8	110.3	46.9	86.5	84.1	100.7	81.8	91.9	
7	93.8	87.4	102.8	115.1	66.5 ³⁾	172.9 ³⁾	121.5	134.3	
8	83.2	70.8	102.4	112.9	65.5	76.0	121.4	128.5	
9	98.9	89.2	66.8	78.4	57.5	49.3	99.2	112.5	
Lab. No	dimepiperate		dimethametryn		dimethenamid		dimethoate		
1	108.9	113.0	0.2 ²⁾	N.D. ¹⁾²⁾	103.7	102.3	98.1	93.1	
2	134.5	134.5	10.9	6.7	97.0	97.5	118.2	108.8	
3	125.8	144.4	9.7	9.5	101.2	113.5	117.8	134.2	
4	108.8	118.6	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	119.1	125.4	168.3	194.1	
5	87.0	96.0	71.5	74.2	82.9	87.7	81.0	85.9	
6	87.1	101.7	94.7	99.7	79.8	78.2	107.6	108.5	
7	126.6	128.5	10.7	11.0	101.8	110.8	127.6	170.3	
8	134.5	125.1	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	113.1	107.8	72.3	114.2	
9	79.4	84.4	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	63.4	66.9	64.5	68.1	
Lab. No	diphenamid		ediphenphos		endrin		EPN		
1	102.1	104.1	129.8	137.0	99.5	114.9	91.3	98.0	
2	102.4	95.9	115.9	106.5	77.1	85.9	167.9	165.9	
3	95.2	104.1	155.8	194.7	119.1	139.0	97.1	108.4	
4	122.8	122.4	195.9	204.4	114.5	129.9	224.9	244.9	
5	82.8	84.0	98.0	117.0	89.2	96.8	97.0	99.7	
6	103.7	107.4	119.5	136.0	151.1	141.8	126.5	137.0	
7	104.7	109.1	77.3	26.7	105.3	100.5	144.2	136.0	
8	104.2	110.6	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	131.9	131.6	143.8	145.8	
9	53.0	52.4	203.6	222.2	83.4	77.7	76.3	69.9	

1)~4) See Table 4-1 (1)

Table 4-1 (5) Collaborative study (formula feed) (continued)

									(µg/kg)
Lab. No	ethalfluralin		ethion		ethofumesate		ethoprophos		
1	83.1	89.9	94.3	106.2	96.6	97.3	113.3	116.6	
2	103.3	101.1	110.8	110.2	105.1	100.4	105.7	101.6	
3	91.4	101.5	98.2	111.9	100.0	110.4	104.6	115.7	
4	143.4	158.1	169.6	175.0	189.0 ³⁾	230.9 ³⁾	127.0	131.3	
5	74.2	74.7	91.3	94.0	91.5	95.0	90.0	90.5	
6	90.0	91.2	155.4	174.5	84.6	79.8	120.9	135.1	
7	99.1	108.8	118.6	122.6	160.3	173.6	109.1	121.7	
8	71.2	101.4	115.9	122.6	115.6	113.1	84.3	114.1	
9	43.9	49.2	73.4	68.5	58.6	55.6	55.4	59.4	
Lab. No	etofenprox		etridiazole		etrimphos		fenarimol		
1	96.6	102.4	101.3	109.6	92.9	94.4	109.4	112.0	
2	111.7	106.2	141.1	133.7	109.1	105.4	112.6	112.1	
3	87.5	101.9	80.6	81.7	103.7	116.2	91.9	102.9	
4	154.5	150.8	108.9	111.7	109.3	115.5	170.9 ⁴⁾	179.7 ⁴⁾	
5	79.9	83.2	81.6	83.7	80.3 ⁴⁾	80.6 ⁴⁾	97.7	111.3	
6	147.7	175.2	128.0	138.7	95.1	110.3	105.9	107.9	
7	127.6	133.1	96.0	105.3	106.3	111.9	113.5	104.6	
8	115.1	117.9	103.4 ³⁾	139.7 ³⁾	94.0	109.3	131.1	130.1	
9	76.7	75.6	41.4	42.0	51.9 ⁴⁾	50.6 ⁴⁾	113.2	113.8	
Lab. No	fenbuconazole		fenitrothion		fenthiocarb		fenpropathrin		
1	92.5	92.5	90.8	92.6	105.5	109.0	105.1	107.2	
2	90.5	84.5	135.8	131.0	112.7	113.0	108.0	107.4	
3	77.2	87.7	118.5	136.1	88.9	103.4	93.4	113.7	
4	155.2 ⁴⁾	169.1 ⁴⁾	232.5	238.7	116.1	121.5	143.1	152.5	
5	73.4	94.8	78.5	80.3	90.4	102.5	76.0	79.3	
6	103.3	104.9	103.7	114.1	84.2	83.5	88.8	92.6	
7	117.0	124.9	164.9	178.9	122.4	133.2	128.2	122.1	
8	98.5	106.1	110.8	149.0	124.6	126.6	774.1 ³⁾	235.0 ³⁾	
9	98.8	96.8	59.6	65.1	104.9	109.0	85.5	86.0	
Lab. No	fenpropimorph		fenthion		fenvalerate		fipronil		
1	3.1	4.0	76.2	78.3	102.7	111.0	59.3	55.8	
2	102.1	99.3	92.0	89.8	108.2	124.4	100.3	99.9	
3	87.3	98.8	71.4	73.3	91.8	125.3	104.9	116.4	
4	109.5	115.8	98.0	102.1	231.0	232.4	154.5	166.4	
5	62.5	62.5	36.9	38.0	85.9	85.7	75.9	76.5	
6	87.6	94.5	79.0	85.6	136.5	158.2	64.2	67.6	
7	109.7	114.4	87.7	91.6	156.9	154.7	131.0	145.0	
8	98.1	106.8	89.4	92.1	98.4	123.9	62.6	99.2	
9	54.8	49.1	39.4	36.6	95.7	97.9	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	

1)~4) See Table 4-1 (1)

Table 4-1 (6) Collaborative study (formula feed) (continued)

									($\mu\text{g}/\text{kg}$)
Lab. No	flamprop-methyl		flucythrinate		fludioxonil		flumiclorac pentyl		
1	105.8	107.9	109.1	112.1	259.0	330.6	97.6	101.8	
2	103.7	98.6	115.7	117.1	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	119.5	130.1	
3	98.4	97.8	124.4	144.2	N.D. ¹⁾²⁾	72.6 ²⁾	108.3	123.4	
4	126.9	133.6	163.2	189.4	112.3	118.9	301.4 ⁴⁾	321.4 ⁴⁾	
5	96.0	96.4	91.0	102.9	67.4	83.8	86.2	90.4	
6	129.7	135.7	69.9	78.0	59.6	51.0	164.9 ³⁾	214.1 ³⁾	
7	29.3	18.6	156.4	161.4	201.0	122.6	151.5	161.3	
8	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	153.0	147.4	353.2	202.4	146.2	150.4	
9	64.5	62.0	173.6	173.1	94.1	89.8	103.7	112.6	
Lab. No	flumioxazin		flutolanil		flutriafol		fluvalinate		
1	96.2	99.1	108.6	117.1	80.9	70.7	90.8	101.4	
2	126.2	129.5	71.3	60.4	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	107.2	109.4	
3	117.7	148.9	65.9	78.3	114.8	82.7	99.2	128.3	
4	233.4	259.2	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	182.5	201.6	
5	67.4	73.1	96.1	94.4	31.9	47.3	77.2	89.1	
6	63.7	62.1	56.7	39.0	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	68.2	74.3	
7	155.5	152.8	108.5	113.4	63.3	71.5	165.0	164.7	
8	133.5	119.3	91.8	84.3	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	154.0	148.6	
9	169.6	209.6	79.1	78.0	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	150.3	162.7	
Lab. No	fosthiazate		halfenprox		heptachlor		heptachlor-epoxyde		
1	125.5	122.0	85.0	98.7	96.9	106.4	92.8	95.6	
2	173.9	172.1	126.1	116.3	32.0	38.3	33.7	42.8	
3	186.3	234.5	72.4	91.6	97.4	109.4	81.6	93.8	
4	137.0	149.6	230.4 ⁴⁾	224.4 ⁴⁾	112.0	119.1	105.8	114.4	
5	67.1	84.9	95.6	96.1	70.7	77.0	71.1	76.0	
6	54.1	67.5	119.0	130.5	78.9	79.2	86.7	79.6	
7	172.7	205.8	134.5	138.9	98.6	100.8	91.3	95.8	
8	126.5	133.0	118.9	134.0	121.8	135.2	111.8	107.6	
9	122.6	136.5	88.0	88.8	54.5	52.5	54.6	51.7	
Lab. No	hexaconazole		hexazinone		imazamethabenz methyl ester		iprobenfos		
1	94.5	100.7	0.8	1.5	55.0	62.1	105.9	110.0	
2	79.4	89.0	111.3	103.2	81.0	80.2	141.8	138.3	
3	83.8	94.7	2.2	8.0	53.6	63.7	154.7	169.3	
4	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	60.4	72.2	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	149.7	154.9	
5	68.4	88.0	15.4	16.2	40.2	35.0	88.7	88.4	
6	39.2	62.3	3.3	7.5	107.6	102.5	136.0	176.9	
7	77.0	76.5	19.5	19.0	46.5	51.9	131.7	145.6	
8	77.2	71.0	16.2 ³⁾	60.6 ³⁾	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	84.6	128.7	
9	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	36.8	35.5	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	64.4	70.4	

1)~4) See Table 4-1 (1)

Table 4-1 (7) Collaborative study (formula feed) (continued)

(µg/kg)								
Lab. No	isazofos		isofenphos		isoprothiolane		kresoxim-methyl	
1	98.5	97.8	105.0	82.3	103.4	115.1	103.5	105.6
2	126.2	120.5	101.3	96.1	58.0	56.0	103.3	99.2
3	114.9	135.0	89.3	101.2	186.2 ³⁾	86.4 ³⁾	105.8	110.0
4	104.6	104.2	122.6	121.8	141.3	159.4	150.5	153.4
5	99.0	98.5	80.4	81.0	93.5	91.4	96.6	97.0
6	130.7	147.4	98.7	111.0	128.8	135.5	121.8	124.3
7	115.1	118.6	116.9 ³⁾	43.6 ³⁾	115.6	106.7	110.4	96.7
8	109.9	134.3	92.3	107.4	85.4	77.2	113.2	105.4
9	60.6	61.5	56.1	53.9	62.1	61.9	69.7	63.9
Lab. No	malathion		metalaxyl		methacrifos		methidathion	
1	98.5	101.2	61.3	35.6	106.8	115.4	103.4	104.8
2	114.6	98.6	39.4	39.2	87.3	88.3	126.7	123.7
3	110.6 ³⁾	63.5 ³⁾	40.6	25.1	90.1	98.9	97.8	128.4
4	131.6	130.1	65.2	77.5	115.5	119.8	152.5	152.3
5	81.0	83.0	4.6	10.3	86.4	91.1	136.3 ³⁾	233.5 ³⁾
6	117.5	129.1	71.3	53.6	85.0	84.3	80.3	104.2
7	140.1	146.1	33.9	50.5	97.4	108.8	129.0	132.9
8	112.5	114.7	15.6	8.9	104.4	113.2	86.6	121.7
9	64.1	65.6	42.3	43.2	52.0	54.2	94.4	105.6
Lab. No	methoxychlor		metolachlor		<i>(E)</i> -metominostrobin		mevinphos	
1	102.0	103.8	98.1	101.9	109.2	115.5	88.2	71.4
2	131.4	112.6	108.5	106.4	49.6	49.4	91.0	90.5
3	85.6	83.8	96.7	106.9	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	88.2	99.8
4	133.9	141.4	124.9	129.9	148.6	136.1	109.5	117.5
5	86.9	96.2	82.7	81.1	87.9	99.6	29.6	48.5
6	112.8	98.0	107.4	108.8	84.4	83.1	24.8	36.4
7	100.9	98.7	111.4	111.3	108.6	93.1	127.9	147.9
8	156.6	148.5	110.4	114.8	74.5 ³⁾	32.7 ³⁾	87.8	93.6
9	75.3	69.7	55.7	54.2	105.2	106.0	71.6	78.9
Lab. No	napropamide		nitrothal-isopropyl		oxadiazon		oxadixyl	
1	121.3	119.5	80.4	89.1	96.6	101.1	4.0	3.2
2	98.9	94.2	130.7	123.8	85.5	85.0	32.6	62.8
3	96.5	93.5	74.9	86.2	96.2	103.4	103.8	123.4
4	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	198.6	216.3	112.9	125.6	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾
5	84.5	97.9	72.9	74.8	81.6	87.1	23.8	46.8
6	86.1	85.6	76.6	77.9	104.5	93.6	51.7	55.2
7	123.5	139.4	136.9	153.4	101.8 ³⁾	63.4 ³⁾	117.4 ³⁾	29.4 ³⁾
8	109.6	100.0	91.8	126.8	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	58.6	29.4
9	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	49.9	57.3	70.4	66.7	71.3	78.7

1)~4) See Table 4-1 (1)

Table 4-1 (8) Collaborative study (formula feed) (continued)

									(µg/kg)
Lab. No	parathion		parathion-methyl		penconazole		pendimethalin		
1	96.9	105.9	94.2	100.3	77.8	86.3	68.9	78.5	
2	118.2	128.0	135.2	130.8	92.4	88.6	125.5	119.4	
3	116.9	139.2	111.0	122.0	100.8	108.9	96.4	113.5	
4	180.9	204.6	179.9	192.7	117.4	120.8	187.6	201.0	
5	76.8	83.6	78.9	80.3	86.8	90.7	75.0	75.6	
6	63.3	65.3	96.4	120.8	95.9	100.2	92.3	96.5	
7	146.5	170.6	138.5	161.8	98.2	95.9	125.7	136.5	
8	131.4	150.1	76.0	121.5	54.8 ³⁾	86.7 ³⁾	104.5	129.1	
9	88.9	104.3	55.8	65.7	54.7	56.7	50.5	54.8	
Lab. No	<i>cis</i> -permethrin		<i>trans</i> -permethrin		phenothrin		phenthoate		
1	99.9	109.4	100.6	105.0	235.3 ⁴⁾	250.1 ⁴⁾	82.2	85.2	
2	102.4	105.7	103.9	106.1	89.0	83.7	112.1	110.4	
3	86.0	102.4	97.2	104.1	79.8	91.7	84.0	93.0	
4	176.9 ⁴⁾	186.8 ⁴⁾	162.8	171.2	106.4	118.7	128.9	133.2	
5	73.8	82.9	77.0	83.9	83.4	84.5	73.0	74.0	
6	81.5	82.4	81.4	80.6	247.5 ⁴⁾	273.5 ⁴⁾	86.1	94.5	
7	116.4	116.4	118.9	112.5	122.7	125.3	107.2	112.5	
8	116.0	116.1	114.2	117.2	87.2	87.3	72.2 ³⁾	105.8 ³⁾	
9	106.0	99.9	95.6	91.6	73.9	68.2	51.4	49.8	
Lab. No	phorate		phosalone		phosmet		phosphamidon		
1	83.3	89.5	99.5	109.4	96.1	103.1	67.1	56.8	
2	96.8	93.6	139.2	138.4	133.7	133.5	43.7	33.6	
3	66.3	65.9	105.4 ³⁾	172.2 ³⁾	116.9	130.3	73.8	59.7	
4	105.6	110.7	280.3 ⁴⁾	301.0 ⁴⁾	185.2	191.4	96.5	112.9	
5	55.2	53.0	95.5	111.0	84.5	94.6	18.5	30.3	
6	98.3	111.3	121.4	146.7	331.6 ³⁾	450.1 ³⁾	33.8	32.9	
7	85.8	95.2	125.7	135.7	112.5	108.5	63.6	91.8	
8	69.9	89.8	116.5	124.0	100.6	96.7	24.3	26.8	
9	36.3	35.3	137.4	143.3	116.3	109.6	60.8	71.2	
Lab. No	picolinafen		piperophos		pirimiphos-methyl		procymidone		
1	15.9	22.9	185.8	209.9	101.8	103.4	103.8	104.5	
2	107.0	101.1	133.2	131.9	112.2	110.8	96.2	94.7	
3	37.6	59.1	123.7	117.7	90.6	105.1	92.1	103.5	
4	116.6	125.3	209.3	226.5	124.5	133.1	109.2	111.0	
5	20.0	14.6	103.1	120.1	74.1	80.6	83.4	84.0	
6	7.5	19.4	69.5	74.7	69.5	74.2	97.3	100.4	
7	106.6	101.2	137.9	135.1	109.5	114.8	98.7	108.6	
8	106.0	113.1	245.5	266.7	124.7	121.8	94.0	109.7	
9	22.5	22.0	208.0	234.5	65.8	65.0	54.5 ⁴⁾	49.8 ⁴⁾	

1)~4) See Table 4-1 (1)

Table 4-1 (9) Collaborative study (formula feed) (continued)

								(µg/kg)
Lab. No	profenofos		prometryn		propachlor		propanil	
1	97.0	103.6	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	115.2	114.8	102.2	98.8
2	57.3	56.3	802.5 ⁴⁾	770.2 ⁴⁾	106.5	103.5	103.4	103.2
3	108.4	123.3	43.1	17.4	95.0	108.2	99.3	115.2
4	143.9	159.1	98.9	99.8	123.1	130.0	126.1	132.7
5	81.8	87.9	81.0	81.1	86.1	94.4	76.7	90.8
6	88.0	101.3	86.6	119.4	92.3	91.0	69.1	71.1
7	99.0	64.8	51.4	41.5	106.7	112.8	114.8	126.3
8	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	111.8	110.7	113.5	121.7
9	67.3	65.1	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	61.9	64.8	131.4	143.8
Lab. No	propargite		propazine		propetamphos		propham	
1	118.7	124.4	103.4	96.3	100.4	98.5	121.1	119.8
2	95.6	126.0	89.5	84.0	99.8	97.2	113.1	113.3
3	92.8	110.8	87.1	92.0	90.7	99.4	94.2	105.1
4	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	95.0	108.4	135.5	144.0	121.2	129.6
5	88.7	95.4	87.9	88.0	81.3	80.7	98.6	104.1
6	107.9	103.5	104.9	116.6	99.5	116.5	98.0	96.6
7	121.1	111.0	50.8	41.3	109.5	117.1	8313.0 ³⁾	8470.4 ³⁾
8	107.9	95.7	72.7	83.2	87.5	108.4	113.4	118.1
9	146.9	137.5	46.7	46.7	52.4	54.4	65.1	68.1
Lab. No	propiconazole		pyraclofos		pyridaben		pyridaphenthion	
1	109.3	118.7	43.2	53.7	96.9	103.5	104.9	111.3
2	187.9	126.3	192.1	183.3	115.1	116.1	141.6	133.5
3	117.1	141.9	105.5	135.9	99.1	95.5	106.7	119.9
4	113.7	124.3	232.5	243.1	224.3 ⁴⁾	231.7 ⁴⁾	225.9	242.3
5	91.1	104.5	43.8	34.4	77.2	86.0	93.2	97.1
6	77.7	72.6	74.3	85.3	76.0	77.4	269.9 ³⁾	360.7 ³⁾
7	128.5	128.5	194.3	186.7	110.1	116.1	144.0	153.1
8	116.5	73.7	137.8	146.7	110.3	116.0	140.0	153.2
9	135.6	136.1	80.1	79.5	113.3	113.8	97.7	99.3
Lab. No	pyriproxyfen		quinoclamine		quinoxifen		quintozene	
1	98.0	104.0	5.9	10.1	30.4	39.2	74.3	78.6
2	114.6	117.7	88.0	84.2	48.5	52.2	36.4	47.1
3	81.4	106.1	25.7	49.3	24.4	45.0	85.8	102.2
4	130.6	136.5	80.0	76.4	95.9	104.8	136.5	147.9
5	86.8	95.8	18.5	16.3	10.6	3.0	47.4	54.4
6	102.7	105.5	6.9	8.9	14.4	11.5	47.3	43.0
7	114.6	119.5	103.1	101.8	53.6	47.1	92.2	100.6
8	97.4	96.4	64.8	78.4	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	107.8	110.8
9	149.4	136.5	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	25.8	24.7	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾

1)~4) See Table 4-1 (1)

Table 4-1 (10) Collaborative study (formula feed) (continued)

		(μg/kg)						
Lab. No	silafloufen		tebuconazole		tebufenpyrad		tecnazene	
1	101.3	105.7	89.4	90.2	99.0	106.1	99.2	102.8
2	102.9	102.0	121.0	114.9	125.1	122.9	81.5	84.3
3	85.7	103.9	97.8	103.5	98.4	112.1	84.7	96.6
4	140.4	151.1	154.2	163.3	144.5	154.9	131.3 ⁴⁾	138.0 ⁴⁾
5	68.3	74.5	106.1	94.1	77.6	86.8	76.0	79.1
6	66.7	85.6	134.0	152.1	99.1	92.7	97.8	95.8
7	115.3	122.8	22.2 ³⁾	145.4 ³⁾	116.2	116.0	96.3	100.5
8	127.2	123.1	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	125.8	125.6	84.0	100.5
9	95.7	93.6	84.4	82.0	97.5	97.7	40.8 ⁴⁾	42.5 ⁴⁾
Lab. No	tefluthrin		terbacil		terbufos		terbutryn	
1	94.0	93.7	131.2	134.1	86.1	89.7	N.D. ¹⁾²⁾	60.7 ²⁾
2	95.9	96.2	165.1	160.0	91.7	90.0	45.3	42.6
3	80.5 ³⁾	97.9 ³⁾	152.7	187.1	76.2	82.2	83.4	86.4
4	110.3	116.0	143.1	153.2	114.3	119.5	126.1	139.8
5	76.7	81.0	93.7	106.1	63.2	62.2	72.2	80.8
6	81.0	80.1	111.5	127.7	96.4	107.6	63.0	69.7
7	92.3	100.4	140.4	155.1	92.5	98.3	53.5	43.9
8	112.6	112.2	81.1	88.5	77.9	100.7	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾
9	57.5	55.8	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	41.5	41.1	60.9	68.7
Lab. No	tetrachlorvinphos		tetraconazole		tetradifon		thiobencarb	
1	108.9	109.2	83.4	88.8	95.5	100.9	97.5	96.5
2	117.5	119.1	104.7	100.8	82.2	85.6	89.4	118.2
3	145.3	157.0	101.6	112.7	93.1	99.2	81.1	104.9
4	144.1	148.9	114.4	124.7	122.6	129.6	122.5	130.8
5	85.5	93.9	70.0	70.2	82.1	84.4	79.0	86.5
6	125.2 ³⁾	159.5 ³⁾	80.6	85.6	108.3	116.7	79.3	80.1
7	134.2	137.1	105.0	106.5	97.0	98.1	111.5	115.3
8	105.0	102.8	64.3 ³⁾	95.8 ³⁾	106.1	104.0	166.4	129.5
9	81.1	79.3	56.2	59.0	54.3	52.2	63.8	62.6
Lab. No	tolylfluanid		triadimefon		triadimenol		tri-allate	
1	71.9	77.7	99.2	104.6	115.6	124.5	96.0	99.5
2	140.2	131.6	117.2	118.2	106.9	106.3	89.9	91.0
3	96.4	111.1	104.6	119.1	382.5	369.3	84.7	98.1
4	111.6	116.3	124.0	133.7	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	108.4	116.9
5	66.9	68.5	71.4	85.6	996.8 ³⁾	3063.7 ³⁾	75.6	79.4
6	81.7	79.9	75.7	83.4	33.9	61.6	85.2	83.4
7	108.9	113.8	113.8	109.8	136.5	122.1	92.3	97.2
8	98.2	113.4	193.3 ³⁾	135.4 ³⁾	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	108.6	107.9
9	53.1	54.1	78.6	87.4	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	53.9	56.9

1)~4) See Table 4-1 (1)

Table 4-1 (11) Collaborative study (formula feed) (continued)

Lab. No	(µg/kg)					
	trifloxystrobin		trifluralin		vinclozolin	
1	105.2	111.0	102.2	112.2	96.9	88.8
2	102.7	95.2	111.5	115.3	97.3	94.2
3	96.2	106.6	93.3	111.4	95.4	106.9
4	166.0	171.9	148.7	164.9	116.0	123.1
5	95.7	97.6	69.6	78.2	79.4	77.8
6	226.4	246.7	60.0	67.8	124.9	127.4
7	99.5	94.5	93.9	107.3	106.4	114.5
8	90.6 ³⁾	29.4 ³⁾	96.3	111.2	96.7	108.9
9	78.1	70.6	57.7	70.6	48.4	47.5

1)~4) See Table 4-1 (1)

Table 4-2 (1) Collaborative study (alfalfa)

								($\mu\text{g}/\text{kg}$)
Lab. No	acetochlor		acrinathrin		alachlor		aldrin	
1	114.2	116.2	54.5	66.5	115.2	113.5	80.3	87.3
2	127.4	116.1	109.8	112.9	118.5	117.8	71.0	75.6
3	109.0	112.6	60.8	70.8	104.4	102.8	89.9	86.2
4	119.3	129.2	147.0	164.2	116.4	122.4	92.1	100.5
5	109.6	119.7	86.4	91.9	102.5	109.5	78.3	83.2
6	154.7 ⁴⁾	160.3 ⁴⁾	89.3	116.6	105.2	117.0	89.2	98.9
7	102.4	99.7	122.5	130.2	109.1	106.3	84.7	84.5
8	109.2	123.4	105.0	114.3	110.5	124.0	99.4	98.2
9	61.9 ⁴⁾	58.4 ⁴⁾	128.7	120.1	71.3 ⁴⁾	66.0 ⁴⁾	48.1	44.8
Lab. No	allethrin		allidochlor		ametryn		anilofos	
1	117.6	143.2	147.0	145.0	1353.0 ³⁾	1557.0 ³⁾	133.4	133.2
2	136.2	122.3	126.3	96.2	92.9	107.8	162.7	151.8
3	105.5	112.7	47.4	99.0	58.9	74.8	129.4	139.3
4	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	136.9	144.8	82.5	87.7	185.4	199.8
5	70.6	73.1	76.7	97.4	100.3	95.2	129.4	143.0
6	143.7	161.8	105.2	127.6	83.1	108.2	503.0 ³⁾	587.9 ³⁾
7	109.6	108.3	88.7	83.3	81.7	71.4	132.3	133.2
8	108.5	133.8	115.2	134.1	104.1	117.4	126.3	127.3
9	65.8	64.5	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	76.7	73.4	113.8	105.1
Lab. No	atrazine		azamethiphos		azinphos-methyl		benfluralin	
1	117.3	118.8	386.9	374.8	143.4	145.4	89.5	94.8
2	114.5	115.8	208.8	234.5	102.4	78.8	123.4	120.1
3	89.6	113.5	110.4	132.9	105.8	121.3	93.5	96.6
4	111.5	112.3	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	195.2	198.7	129.3	140.5
5	106.4	114.7	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	16.4	94.0	96.7	108.0
6	144.7 ⁴⁾	162.6 ⁴⁾	151.2	172.9	211.3	249.4	87.9	111.2
7	100.8	101.6	145.1	142.2	143.6	150.1	97.2	97.7
8	99.8	109.0	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	55.4	145.6	104.3	108.8
9	58.8 ⁴⁾	54.4 ⁴⁾	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	681.6 ⁴⁾	626.9 ⁴⁾	75.5	70.5
Lab. No	benoxacor		α -BHC		β -BHC		γ -BHC	
1	129.8	141.5	104.7	108.6	84.8	86.1	87.8	85.9
2	154.0	132.7	89.5	97.0	89.5	93.2	93.7	99.3
3	98.2	102.0	98.8	102.8	96.9	98.0	65.5	68.1
4	188.9	202.6	107.7	112.6	108.3	111.4	100.8	103.6
5	103.7	118.6	97.7	105.7	107.1	115.7	43.6	47.8
6	154.3	182.9	113.8	123.9	123.3	132.7	92.1	101.7
7	106.5	108.4	89.0	88.0	94.6	90.6	93.7	83.9
8	113.7	124.3	107.5	117.0	91.7	101.1	183.5 ³⁾	120.6 ³⁾
9	60.5	57.1	94.5	96.8	52.9	51.4	43.4	32.3

1) Not Detected

2) Without analysis

3) Data excluded by Cochran test

4) Data excluded by Grubbs test

Table 4-2 (2) Collaborative study (alfalfa) (continued)

									(µg/kg)
Lab. No	δ-BHC		bifenthrin		bromacil		bromobutide		
1	102.9	108.7	88.6	93.4	138.2	139.1	102.0	107.0	
2	107.8	113.3	115.3	113.3	1805.3 ³⁾	995.8 ³⁾	109.8	113.5	
3	93.9	97.2	85.8	84.1	126.2	137.8	113.9	114.9	
4	93.8	97.1	131.9	143.2	184.2	171.0	122.5	127.0	
5	98.8	104.9	79.3	85.7	137.0	144.0	97.5	104.4	
6	114.1	127.2	117.9	135.0	254.5	222.2	118.7	126.6	
7	91.6	90.6	94.6	92.4	115.5	136.4	112.3	114.9	
8	90.8	110.8	104.3	97.0	128.3	131.5	109.4	120.8	
9	47.2 ⁴⁾	44.8 ⁴⁾	87.3	77.6	78.6	76.0	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	
Lab. No	bromophos		bromopropylate		bupirimate		butamifos		
1	101.0	100.8	108.7	111.2	110.0	108.4	127.6	140.7	
2	104.6	106.6	133.1	126.4	119.9	114.7	147.7	148.5	
3	79.0	92.5	96.9	100.6	88.9	109.6	86.4	88.0	
4	98.0	105.6	137.7	150.8	112.2	121.2	162.8	172.1	
5	81.9	85.6	109.7	119.9	104.7	113.0	122.5	141.8	
6	116.9 ³⁾	163.8 ³⁾	276.8 ³⁾	313.6 ³⁾	185.0	219.3	145.0	171.6	
7	99.7	96.9	123.8	119.1	15.4 ³⁾	98.4 ³⁾	140.1	143.1	
8	108.8	112.4	113.3	112.6	114.2	126.2	133.5	153.0	
9	61.0	56.1	76.4	73.6	66.2	64.7	129.9	119.9	
Lab. No	cadusafos		carfentrazone-ethyl		chlorbenzilate		cis-chlordane		
1	214.6	206.3	113.3	121.7	121.0	117.5	80.7	89.5	
2	125.4	122.7	149.8	144.0	128.1	117.4	36.2 ⁴⁾	48.4 ⁴⁾	
3	123.4	132.7	101.7	100.0	100.6	104.6	90.5	87.4	
4	175.7	183.1	135.3	139.5	129.1	140.8	92.6	100.4	
5	176.1	204.4	123.0	136.3	110.9	120.9	84.9	90.6	
6	247.9	274.0	149.2	175.0	210.4 ⁴⁾	228.1 ⁴⁾	103.3	111.8	
7	121.1	122.5	118.7	124.7	115.4	114.2	88.4	84.9	
8	175.1	208.8	121.9	128.0	119.6	125.9	95.8	99.5	
9	87.4	82.9	117.3	103.3	73.7	68.0	53.6 ⁴⁾	49.2 ⁴⁾	
Lab. No	oxychlordane		trans-chlordane		chlorfenapyr		(E)-chlorfenvinphos		
1	76.5	82.2	85.1	99.5	94.9	100.2	118.1	125.2	
2	28.2 ⁴⁾	35.4 ⁴⁾	38.8	50.7	105.4	112.6	103.3	112.2	
3	89.4	87.6	92.3	89.0	81.1	86.0	125.7	128.8	
4	98.7	104.7	101.5	110.9	89.2	93.2	130.2	136.0	
5	82.6	90.2	86.7	92.1	109.2	114.0	111.3	122.2	
6	98.2	108.2	103.7	114.7	123.9	137.4	131.4	148.2	
7	84.6	86.9	90.0	89.0	98.7	96.6	112.3	114.7	
8	90.7	94.3	102.6	107.0	117.6	116.2	112.6	128.1	
9	48.7 ⁴⁾	46.8 ⁴⁾	56.9	51.2	84.6	78.8	122.5	110.5	

1)~4) See Table 4-1 (1)

Table 4-2 (3) Collaborative study (alfalfa) (continued)

									(µg/kg)
Lab. No	(Z)-chlorfenvinphos		chlorpropham		chlorpyrifos		chlorpyrifos-methyl		
1	116.5	121.0	129.1	134.1	104.4	101.8	79.3	78.7	
2	117.9	123.2	131.8	132.8	111.3	112.5	119.9	114.2	
3	124.1	127.8	117.2	123.6	72.9	88.0	85.7	96.4	
4	135.1	139.7	123.9	123.7	95.6	102.7	93.9	104.6	
5	106.4	116.8	118.4	130.2	91.2	96.1	84.7	90.8	
6	129.7	145.6	148.6	161.0	112.8 ³⁾	149.2 ³⁾	137.4 ³⁾	164.8 ³⁾	
7	116.6	115.0	114.5	114.9	97.3	98.4	94.8	96.9	
8	115.5	131.8	108.2	118.1	104.6	106.6	120.9	117.1	
9	104.3	99.1	85.8	80.5	57.4	51.7	58.8	57.0	
Lab. No	chlorthal-dimethyl		coumaphos		cyanophos		cyfluthrin		
1	109.2	107.4	N.D. ¹⁾²⁾	2.4 ²⁾	661.2	649.0	270.8	352.9	
2	79.7	89.6	80.0	49.2	123.6	117.4	108.2	101.3	
3	94.0	95.2	9.9	0.4	113.1	119.5	110.1	97.6	
4	100.6	107.0	41.8	28.7	105.1	111.5	396.3	466.5	
5	96.7	103.7	N.D. ¹⁾²⁾	23.1 ²⁾	101.0	110.6	111.4	211.1	
6	112.8	121.9	6.5	7.4	719.6	646.7	165.5	204.3	
7	94.6	96.3	11.9	12.5	125.2	109.3	125.1	132.0	
8	109.2	119.5	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	609.0	698.9	10.6	4.9	
9	59.1	54.8	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	60.1	62.0	225.8	201.3	
Lab. No	cyhalothrin		cypermethrin		cyproconazole		<i>o,p'</i> -DDD		
1	511.0 ⁴⁾	494.6 ⁴⁾	129.2	154.7	111.5	116.3	92.1	96.0	
2	108.1	105.1	508.3	449.3	110.5	92.1	100.7	106.0	
3	101.0	94.0	N.D. ¹⁾²⁾	259.2 ²⁾	98.2	99.8	83.9	81.9	
4	148.4	169.5	508.3	449.3	118.1	115.8	98.9	107.5	
5	90.4	102.4	161.2	167.5	145.2	157.1	88.6	95.4	
6	218.0 ³⁾	294.9 ³⁾	235.1	364.7	157.2	117.2	99.9	110.8	
7	110.4	111.8	325.0	253.3	87.3	113.5	88.9	88.8	
8	101.3	100.5	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	92.7	111.7	96.4	104.1	
9	91.4	84.3	128.1	186.7	152.5	139.6	58.8	54.4	
Lab. No	<i>p,p'</i> -DDD		<i>o,p'</i> -DDE		<i>p,p'</i> -DDE		<i>o,p'</i> -DDT		
1	97.1	105.9	81.1	86.0	79.7	85.7	86.9	95.7	
2	105.6	109.3	84.0	86.7	89.0	95.2	139.3	125.6	
3	95.8	91.0	94.4	91.3	83.1	78.9	83.8	80.9	
4	109.7	118.2	87.8	97.1	87.4	95.8	106.4	117.9	
5	93.8	100.8	87.0	93.7	90.6	102.0	93.3	101.8	
6	123.5	138.1	100.7	110.5	99.5	107.9	97.9	116.3	
7	108.7	108.4	89.4	87.5	81.4	82.5	121.1	121.0	
8	102.1	101.8	104.6	107.8	100.3	106.6	129.6	139.0	
9	73.7	64.7	51.5 ⁴⁾	45.2 ⁴⁾	53.4	48.1	64.5	58.0	

1)~4) See Table 4-1 (1)

Table 4-2 (4) Collaborative study (alfalfa) (continued)

									(µg/kg)
Lab. No	<i>p,p'</i> -DDT		deltamethrin		diazinon		dichlorvos		
1	93.7	104.7	72.6	89.2	125.3	129.2	13.3	9.1	
2	219.7 ³⁾	185.2 ³⁾	125.9	137.3	128.1	120.9	11.2	11.1	
3	82.4	81.3	59.5	67.6	115.2	119.1	9.8	13.9	
4	99.8	108.5	137.1	155.5	130.0	136.0	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	
5	98.3	107.6	118.3	136.9	134.8	148.0	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	
6	149.2 ³⁾	212.2 ³⁾	120.9	168.5	115.0 ³⁾	148.0 ³⁾	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	
7	95.4	94.7	124.4	129.6	113.9	117.3	4.3	3.7	
8	139.9	144.1	107.0	117.4	117.6	126.2	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	
9	70.0	64.4	185.7	171.1	78.7 ⁴⁾	75.8 ⁴⁾	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	
Lab. No	diclofop-methyl		dicloran		dieldrin		difenoconazole		
1	105.3	109.0	125.9	131.0	93.6	97.7	119.8	128.9	
2	191.1 ³⁾	112.2 ³⁾	118.2	123.3	113.3	109.2	128.9	99.3	
3	91.9	94.5	68.2	84.0	85.3	89.2	138.2	161.6	
4	124.0	129.7	165.1	168.7	92.7	100.9	150.2	157.0	
5	107.3	117.9	109.6	124.6	94.1	102.0	154.7	160.4	
6	142.4	154.4	120.8	146.2	84.6	99.4	170.4	238.0	
7	103.0	100.0	111.2	111.4	86.0	84.3	88.0	120.5	
8	120.1	132.0	116.6	130.2	96.2	98.0	128.2	120.0	
9	99.8	96.2	96.7	90.5	50.5 ⁴⁾	46.8 ⁴⁾	174.5	167.4	
Lab. No	dimepiperate		dimethametryn		dimethenamid		dimethoate		
1	123.8	122.3	0.2 ²⁾	N.D. ¹⁾²⁾	106.2	107.8	103.4	103.4	
2	150.3	148.9	116.7	112.3	112.1	116.3	124.3	107.5	
3	145.2	156.2	82.3	101.8	116.8	118.2	139.1	154.9	
4	97.0	104.5	121.0	127.4	115.8	120.4	479.8 ⁴⁾	541.0 ⁴⁾	
5	124.3	140.6	93.6	102.8	108.1	115.0	120.4	129.5	
6	166.3	191.4	135.6	162.6	113.2	124.8	456.9 ³⁾	1166.3 ³⁾	
7	162.9	159.4	98.5	100.7	106.3	104.4	122.2	145.9	
8	120.3	147.4	103.9	112.4	112.6	127.8	104.5	192.8	
9	93.7	92.3	59.1	58.8	76.6 ⁴⁾	72.3 ⁴⁾	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	
Lab. No	diphenamid		ediphenphos		endrin		EPN		
1	122.7	121.7	159.7	153.8	109.0	117.3	113.7	112.9	
2	118.7	114.3	162.5	163.1	112.8	116.9	838.4 ³⁾	163.2 ³⁾	
3	106.1	111.7	184.8	212.5	151.8	129.8	82.3	93.8	
4	114.9	120.3	181.4	193.5	114.5	122.5	179.7	193.0	
5	95.4	104.0	153.6	168.5	102.9	118.3	117.6	127.3	
6	130.2	138.0	331.4 ⁴⁾	382.8 ⁴⁾	254.3 ⁴⁾	256.9 ⁴⁾	180.8 ³⁾	221.2 ³⁾	
7	102.0	99.6	143.8	141.6	101.8	101.2	148.4	141.0	
8	109.1	118.1	132.8	141.4	125.5	128.8	114.7	111.1	
9	54.7 ⁴⁾	51.6 ⁴⁾	262.1 ⁴⁾	245.2 ⁴⁾	90.4	83.4	83.3	77.2	

1)~4) See Table 4-1 (1)

Table 4-2 (5) Collaborative study (alfalfa) (continued)

									($\mu\text{g}/\text{kg}$)
Lab. No	ethalfluralin		ethion		ethofumesate		ethoprophos		
1	85.9	90.6	105.8	110.3	105.9	101.4	121.5	124.2	
2	110.3	99.8	132.6	123.7	114.2	116.2	115.5	113.1	
3	91.2	99.1	91.2	94.6	112.9	113.2	113.1	121.1	
4	126.0	144.5	157.7	170.2	120.7	121.8	134.8	135.2	
5	90.8	103.4	101.8	112.6	91.8	97.3	119.3	137.9	
6	102.4	123.5	218.4 ³⁾	255.3 ³⁾	105.5	112.4	189.1 ⁴⁾	223.9 ⁴⁾	
7	93.9	89.2	107.5	99.4	100.9	102.1	111.1	110.4	
8	92.7	91.4	116.4	118.8	95.0	107.0	116.2	131.7	
9	53.2	50.0	73.7	68.1	56.0 ⁴⁾	53.8 ⁴⁾	65.0 ⁴⁾	59.4 ⁴⁾	
Lab. No	etofenprox		etridiazole		etrimphos		fenarimol		
1	96.7	95.4	112.1	108.9	101.2	105.7	130.3	135.5	
2	128.0	116.9	130.3	97.2	122.0	107.4	127.7	132.2	
3	83.9	86.5	39.3	78.9	110.6	116.5	107.5	107.9	
4	157.1	175.0	99.1	107.6	98.0	108.6	162.8	168.5	
5	92.4	101.2	79.8	102.2	98.8	109.3	142.8	166.0	
6	254.1 ³⁾	369.2 ³⁾	138.8	200.8	134.4 ⁴⁾	154.3 ⁴⁾	154.7	149.6	
7	116.4	114.9	84.1	80.2	99.7	104.6	111.2	111.4	
8	113.1	115.4	114.6	127.6	110.9	115.9	126.6	159.4	
9	87.6	78.6	45.6	42.1	58.1 ⁴⁾	53.4 ⁴⁾	124.6	118.3	
Lab. No	fenbuconazole		fenitrothion		fenthiocarb		fenpropathrin		
1	109.1	114.0	111.5	111.0	121.4	121.6	92.0	93.3	
2	105.8	74.6	148.6	138.3	108.7	113.8	134.6	114.6	
3	80.4	93.9	89.0	94.0	106.0	112.6	81.6	85.8	
4	149.1	161.1	183.9	198.9	127.6	132.3	140.7	166.0	
5	165.9	156.6	99.1	115.7	130.4	144.6	80.9	90.0	
6	200.4	182.3	185.3	221.6	128.9	151.0	160.1	208.6	
7	61.7	105.7	165.8	160.9	102.8	102.4	100.7	96.9	
8	99.6	88.2	125.0	129.1	97.3	111.1	90.4	91.1	
9	144.2	136.0	75.1	75.3	105.2	102.4	344.3 ⁴⁾	313.3 ⁴⁾	
Lab. No	fenpropimorph		fenthion		fenvalerate		fipronil		
1	3.4 ⁴⁾	3.8 ⁴⁾	72.1	78.3	98.2	122.3	98.0	102.9	
2	135.5	114.1	111.0	90.4	126.5	123.9	125.3	115.3	
3	96.9	100.3	53.7	91.1	112.8	165.5	108.6	111.9	
4	106.1	114.4	82.9	95.7	152.4	180.4	135.8	148.6	
5	78.6	82.4	53.2	61.1	93.7	106.4	96.2	107.8	
6	108.1	121.1	108.7	120.8	221.6 ⁴⁾	283.2 ⁴⁾	139.7	153.6	
7	130.0	104.0	81.4	85.0	136.9	135.6	125.4	132.6	
8	107.6	114.2	73.1	74.0	109.7	106.7	107.1	111.8	
9	52.2 ⁴⁾	51.0 ⁴⁾	45.4	42.6	110.3	101.2	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	

1)~4) See Table 4-1 (1)

Table 4-2 (6) Collaborative study (alfalfa) (continued)

		(µg/kg)							
Lab. No	flamprop-methyl		flucythrinate		fludioxonil		flumiclorac pentyl		
1	115.9	116.3	94.9	102.7	281.5 ⁴⁾	298.4 ⁴⁾	111.3	107.1	
2	118.4	113.8	140.6	138.2	96.7	113.6	145.4	133.1	
3	103.8	107.5	104.5	102.5	52.5	55.6	103.1	110.6	
4	124.9	130.2	169.4	202.2	97.7	100.6	223.1 ⁴⁾	262.5 ⁴⁾	
5	110.0	119.5	142.0	157.3	98.8	106.8	113.9	126.3	
6	148.5 ⁴⁾	159.6 ⁴⁾	164.4	210.2	72.4	79.6	400.6 ³⁾	500.6 ³⁾	
7	99.9	103.4	137.0	138.4	111.5	116.2	142.0	143.8	
8	107.5	115.3	129.6	137.2	112.5	111.3	128.2	120.0	
9	62.3 ⁴⁾	57.7 ⁴⁾	253.1	214.4	99.9	88.8	139.7	137.9	
Lab. No	flumioxazin		flutolanil		flutriafol		fluvalinate		
1	137.8	144.3	125.3	125.7	96.9	98.0	90.7	101.6	
2	167.1	169.8	115.6	116.2	80.6	40.0	131.9	134.6	
3	107.1	108.6	99.3	102.5	71.4	75.4	80.2	85.5	
4	197.3	206.8	169.2	180.2	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	132.2	161.8	
5	105.2	114.8	114.1	124.1	97.1	79.5	116.2	137.6	
6	169.1	176.7	145.1 ³⁾	101.7 ³⁾	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	135.8	173.0	
7	147.2	151.3	119.2	125.7	33.9	56.6	137.7	148.1	
8	117.7	143.0	126.4	140.4	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	124.3	127.2	
9	344.4 ⁴⁾	337.8 ⁴⁾	75.6	73.0	80.9	70.6	228.7	208.4	
Lab. No	fosthiazate		halfenprox		heptachlor		heptachlor-epoxyde		
1	184.6	190.2	82.2	90.2	92.4	99.9	97.0	107.8	
2	163.8	168.2	141.6	130.0	49.0	72.5	53.6	62.0	
3	203.1	222.6	72.4	73.2	95.0	95.0	86.9	88.4	
4	181.8	188.0	189.4	211.6	97.7	106.2	95.9	104.4	
5	187.3	196.4	100.1	109.2	91.7	103.2	88.1	94.7	
6	203.3	185.5	181.9 ³⁾	231.7 ³⁾	106.0	131.1	103.3	113.3	
7	134.3	148.8	111.9	117.8	86.1	91.0	85.5	84.8	
8	134.2	165.4	98.6	102.3	114.4	121.8	98.8	101.4	
9	215.7	202.6	99.5	92.0	63.2	60.1	61.0	55.5	
Lab. No	hexaconazole		hexazinone		imazamethabenz methyl ester		iprobenfos		
1	123.4	121.6	4.3	4.2	50.6	52.8	125.6	131.4	
2	112.6	104.6	84.3 ³⁾	30.5 ³⁾	152.0	154.3	154.1	143.4	
3	104.3	105.7	10.0	11.6	89.7	93.6	134.2	142.3	
4	119.8	118.6	72.9	81.0	106.7	96.3	148.1	154.0	
5	159.5	169.0	44.8	46.1	155.5	171.7	122.2	137.6	
6	137.6	149.6	34.4	31.1	116.1	96.9	275.8 ³⁾	338.7 ³⁾	
7	97.8	118.4	24.4	18.6	52.9	50.0	130.3	130.6	
8	126.5	147.1	37.5	45.5	34.5	47.0	130.4	140.4	
9	258.4 ⁴⁾	239.8 ⁴⁾	46.6	46.8	34.1	31.0	94.9	95.3	

1)~4) See Table 4-1 (1)

Table 4-2 (7) Collaborative study (alfalfa) (continued)

									(µg/kg)
Lab. No	isazofos		isofenphos		isoprothiolane		kresoxim-methyl		
1	104.8	111.7	95.0	99.8	122.4	126.5	114.7	115.3	
2	154.3	145.8	117.2	110.4	120.0	118.1	120.0	108.3	
3	118.9	128.7	90.0	100.6	106.7	103.0	103.5	106.6	
4	118.0	125.7	114.0	126.9	122.0	131.4	126.4	135.7	
5	125.5	140.1	94.8	103.3	104.6	119.8	105.9	116.0	
6	171.2	197.9	131.9	165.5	153.5 ⁴⁾	171.5 ⁴⁾	156.8 ⁴⁾	180.6 ⁴⁾	
7	151.6	165.1	102.5	104.1	125.6	127.0	101.6	102.3	
8	135.5	139.7	106.3	117.7	110.9	123.0	113.6	123.6	
9	68.5	62.8	61.5	57.0	61.5 ⁴⁾	56.5 ⁴⁾	65.7 ⁴⁾	62.6 ⁴⁾	
Lab. No	malathion		metalaxyl		methacrifos		methidathion		
1	121.6	117.0	56.1	57.6	122.2	124.5	136.6	124.6	
2	138.5	128.2	172.7	160.4	96.3	95.5	142.6	144.2	
3	108.2	115.0	21.1	28.8	86.1	102.6	138.2	137.8	
4	128.2	134.6	92.9	100.7	111.4	116.9	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	
5	99.6	112.8	52.8	31.3	110.0	116.4	197.3	250.1	
6	207.4 ⁴⁾	239.3 ⁴⁾	171.8 ³⁾	43.5 ³⁾	116.9	124.9	210.6	261.8	
7	115.8	110.5	16.6	24.2	96.3	95.9	123.6	123.4	
8	118.3	135.4	19.8	14.2	90.8	110.3	124.8	148.6	
9	71.2	62.6	43.5	43.2	60.6	55.7	143.3	131.9	
Lab. No	methoxychlor		metolachlor		(E)-metominostrobin		mevinphos		
1	98.1	105.6	115.6	115.0	129.6	126.0	82.1	77.1	
2	192.0	160.9	129.2	118.7	111.4	132.5	41.4	40.3	
3	83.2	83.7	102.3	106.9	109.2	100.6	49.5	52.6	
4	120.9	131.4	118.0	125.8	145.7	150.1	62.9	63.4	
5	107.8	119.7	95.5	105.8	133.5	143.8	57.0	52.3	
6	156.9	182.5	133.4	148.7	152.2	154.4	52.3	71.5	
7	97.2	99.2	101.2	102.1	106.1	107.5	74.9	88.0	
8	141.2	150.8	115.0	122.7	120.9	141.3	38.6	41.3	
9	84.0	80.0	58.4	55.1	108.8	101.3	78.7	70.2	
Lab. No	napropamide		nitrothal-isopropyl		oxadiazon		oxadixyl		
1	140.8	138.3	91.0	96.1	99.6	101.3	6.1 ²⁾	N.D. ¹⁾²⁾	
2	136.0	131.3	137.4	124.9	105.2	106.3	33.1	28.2	
3	95.6	105.1	76.0	87.8	93.2	92.5	12.9	16.4	
4	121.3	120.8	179.9	207.9	104.5	110.3	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	
5	121.6	127.1	92.5	103.4	88.3	93.7	18.1	12.6	
6	128.1	151.2	104.6	122.6	107.4 ³⁾	125.1 ³⁾	16.7	8.1	
7	139.8	135.0	125.5	122.6	97.5	96.4	118.4	179.1	
8	120.3	141.2	108.4	109.9	109.1	114.3	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	
9	94.5	88.9	62.0	59.0	63.7	64.6	53.7	47.7	

1)~4) See Table 4-1 (1)

Table 4-2 (8) Collaborative study (alfalfa) (continued)

(µg/kg)								
Lab. No	parathion		parathion-methyl		penconazole		pendimethalin	
1	123.6	129.1	114.0	113.9	106.1	104.6	82.6	93.4
2	138.7	140.3	156.6	142.3	127.8	117.4	141.4	128.1
3	104.0 ⁴⁾	109.0 ⁴⁾	115.5	121.6	96.6	102.3	99.9	105.4
4	159.9 ⁴⁾	169.0 ⁴⁾	159.8	171.9	111.6	112.7	155.1	172.7
5	117.4	136.2	97.7	112.4	107.8	121.9	94.4	105.8
6	121.0	156.9	170.1	203.3	138.2	157.0	129.6	157.3
7	139.8	126.7	140.4	136.1	100.5	109.3	117.0	112.4
8	127.7	139.1	122.5	124.0	123.8	131.9	103.7	109.1
9	139.0	134.5	78.4	74.7	64.0	60.3	61.1	59.9
Lab. No	<i>cis</i> -permethrin		<i>trans</i> -permethrin		phenothrin		phenthoate	
1	87.8	97.8	89.7	102.5	91.0	98.6	100.5	103.8
2	113.0	115.9	124.1	122.3	123.7	111.6	129.5	114.0
3	93.6	90.3	90.9	87.1	86.1	87.3	90.1	94.4
4	157.2 ⁴⁾	171.2 ⁴⁾	149.2	160.8	150.1	169.6	107.4	116.3
5	95.0	103.2	98.9	106.2	92.7	101.4	90.2	105.0
6	111.6	130.3	117.4	126.2	288.5 ³⁾	339.8 ³⁾	149.6 ⁴⁾	183.3 ⁴⁾
7	99.0	95.6	103.3	104.2	90.0	101.5	104.9	101.3
8	107.0	107.3	104.4	106.3	103.1	102.6	101.6	95.1
9	116.1	99.8	108.8	96.3	73.8	65.9	58.0 ⁴⁾	53.1 ⁴⁾
Lab. No	phorate		phosalone		phosmet		phosphamidon	
1	82.8	85.2	124.4	131.0	127.2	113.0	75.4	80.3
2	112.6	99.9	140.7	142.2	179.4	166.8	52.5	53.1
3	57.6	67.0	77.9	92.0	86.7	108.5	22.4	40.1
4	114.5	104.0	145.4	152.8	171.9	177.5	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾
5	60.9	80.8	125.3	131.1	102.6	107.3	66.9	39.7
6	121.0	153.9	205.3 ³⁾	293.5 ³⁾	858.0 ³⁾	1127.3 ³⁾	88.3	70.2
7	83.6	87.8	121.9	122.8	130.1	131.0	38.1	40.8
8	75.0	81.1	108.2	127.4	120.2	122.6	19.5	22.4
9	42.9	40.1	190.8	168.0	137.6	122.7	115.6	113.2
Lab. No	picolinafen		piperophos		pirimiphos-methyl		procymidone	
1	0.6	4.0	246.7	240.0	113.2	118.6	116.2	113.2
2	77.2	51.6	162.8	162.6	122.1	121.9	117.9	110.7
3	14.9	2.9	126.3	115.4	113.2	114.4	99.1	102.4
4	46.2	47.0	189.1	200.8	105.3	109.2	96.1	103.8
5	11.9	22.0	152.5	168.0	100.2	108.2	92.1	100.5
6	9.1	5.8	164.3	195.1	115.6	132.8	106.4	118.0
7	10.0	9.6	137.1	134.8	101.1	102.9	98.0	95.0
8	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	132.9	139.9	102.9	112.9	112.0	115.5
9	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	288.1	276.7	72.8 ⁴⁾	68.1 ⁴⁾	52.1 ⁴⁾	49.1 ⁴⁾

1)~4) See Table 4-1 (1)

Table 4-2 (9) Collaborative study (alfalfa) (continued)

								($\mu\text{g}/\text{kg}$)
Lab. No	profenofos		prometryn		propachlor		propanil	
1	128.6	122.0	N.D. ¹⁾²⁾	0.4 ²⁾	126.6	124.0	125.5	126.4
2	129.7	127.2	301.2 ³⁾	602.2 ³⁾	125.9	129.1	116.1	115.1
3	120.6	136.4	109.5	122.2	112.2	115.6	93.9 ⁴⁾	92.6 ⁴⁾
4	122.4	138.0	96.1	103.5	133.0	136.9	121.0	122.0
5	104.0	114.2	97.4	109.3	128.6	135.5	124.2	134.3
6	249.7 ³⁾	299.6 ³⁾	146.0 ⁴⁾	148.1 ⁴⁾	134.4	144.9	111.0	126.8
7	136.6	138.2	104.6	102.4	109.0	111.1	115.0	117.8
8	113.3	100.7	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	110.8	131.1	120.0	140.7
9	89.5	82.4	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	76.6 ⁴⁾	70.8 ⁴⁾	165.1 ⁴⁾	152.5 ⁴⁾
Lab. No	propargite		propazine		propetamphos		propham	
1	108.8	100.4	114.2	117.5	189.6	192.4	117.7	121.4
2	103.5	73.9	96.6	93.2	118.2	107.7	116.6	114.6
3	100.9	98.5	113.3	121.5	94.0	96.4	97.4	105.1
4	132.4	144.2	103.1	108.5	617.8 ⁴⁾	621.9 ⁴⁾	108.4	112.5
5	117.2	117.8	114.2	125.6	98.8	108.8	113.6	125.1
6	136.6	151.0	143.3	153.0	145.0	155.0	109.3	111.6
7	84.3	90.7	89.4	91.4	99.5	124.3	16911 ³⁾	14750 ³⁾
8	93.8	125.2	88.9	98.1	98.7	103.1	95.7	111.5
9	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	50.5	46.6	54.7	53.0	68.6 ⁴⁾	64.8 ⁴⁾
Lab. No	propiconazole		pyraclofos		pyridaben		pyridaphenthion	
1	162.8	149.0	21.3	29.1	103.5	107.2	129.1	128.7
2	118.7	164.2	151.1	123.1	142.2	147.1	159.5	148.6
3	173.1	195.5	77.0	41.1	95.0	95.3	107.3	118.1
4	190.2	190.7	102.4	119.2	167.6	186.7	204.8	214.4
5	265.6	292.8	23.8	53.3	109.5	118.8	109.8	120.4
6	102.5	122.3	103.0	36.1	158.2	157.4	534.9 ³⁾	620.3 ³⁾
7	105.4	181.6	32.3	20.7	103.4	111.4	140.6	137.4
8	182.6	198.8	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	100.0	112.8	125.1	132.6
9	203.5	189.0	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	127.7	118.3	115.6	103.1
Lab. No	pyriproxyfen		quinoclamine		quinoxifen		quintozene	
1	101.0	103.5	9.1	12.6	13.8	19.8	90.1	83.2
2	133.1	128.4	54.2 ³⁾	30.7 ³⁾	69.0	55.8	46.6	59.6
3	87.0	90.3	1.7	2.4	26.9	2.4	56.4	55.7
4	115.8	126.2	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	59.1	64.6	102.6	115.3
5	137.9	152.1	15.1	18.9	N.D. ¹⁾²⁾	22.8 ²⁾	53.3	71.0
6	145.3	151.1	29.4	32.6	15.2	6.5	43.8	44.1
7	110.7	111.0	14.3	13.6	9.6	10.4	87.2	82.1
8	104.5	122.8	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	8.5	10.3	82.2	70.0
9	162.7	152.4	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	25.6	32.4	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾

1)~4) See Table 4-1 (1)

Table 4-2 (10) Collaborative study (alfalfa) (continued)

		(µg/kg)						
Lab. No	silafloufen		tebuconazole		tebufenpyrad		tecnazene	
1	90.0	93.2	114.3	114.2	109.1	105.2	110.5	110.7
2	118.2	118.8	125.5	109.4	141.8	141.9	96.1	90.4
3	93.6	86.9	88.1	108.9	104.8	107.3	65.7	87.6
4	137.9	148.9	137.4	135.7	125.7	136.9	96.2	97.5
5	76.0	82.7	144.4	165.7	103.3	110.6	92.3	103.7
6	113.9	133.5	254.9 ⁴⁾	291.5 ⁴⁾	133.7	149.5	103.4	134.0
7	99.0	97.7	109.5	135.1	108.3	106.8	92.2	90.1
8	110.5	112.0	128.3	153.3	118.0	119.0	95.7	101.1
9	108.4	95.6	125.8	123.6	108.6	97.8	45.7	41.4
Lab. No	tefluthrin		terbacil		terbufos		terbutryn	
1	80.7	86.7	172.6	162.1	112.7	117.4	59.8 ⁴⁾	55.5 ⁴⁾
2	105.1	103.3	203.8	192.2	109.2	97.7	119.6	114.5
3	78.7	79.0	183.6	180.7	75.7	83.2	102.4	113.5
4	96.5	107.5	160.8	159.8	107.9	119.4	118.1	121.5
5	86.8	93.6	208.0 ³⁾	261.0 ³⁾	75.7	86.1	101.2	112.2
6	94.7	105.8	561.5 ³⁾	669.9 ³⁾	138.0	162.1	105.6	120.5
7	80.8	81.5	162.4	163.8	98.5	101.6	99.8	100.8
8	101.0	110.6	157.8	168.0	102.3	101.2	112.3	129.1
9	59.5	55.7	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	51.1	50.2	85.0 ⁴⁾	80.8 ⁴⁾
Lab. No	tetrachlorvinphos		tetraconazole		tetradifon		thiobencarb	
1	123.5	125.5	102.6	107.7	101.9	104.2	105.7	103.2
2	141.2	133.7	125.5	108.2	112.2	108.1	117.9	119.3
3	145.8	160.3	109.5	113.8	86.2	98.5	100.5	102.2
4	127.7	136.6	99.0	101.5	114.6	120.5	117.1	124.9
5	108.3	118.7	96.5	106.4	94.9	105.9	124.0	127.4
6	272.4 ³⁾	325.3 ³⁾	130.7	135.0	124.5	137.2	126.8	141.4
7	107.7	117.1	88.7	109.7	95.7	78.2	99.7	109.0
8	120.9	133.2	106.1	111.3	100.9	99.8	105.7	119.7
9	85.4	82.7	68.5	63.8	56.7	53.4	71.0	66.7
Lab. No	tolylfluanid		triadimefon		triadimenol		tri-allate	
1	40.5	40.5	114.4	117.1	158.6	165.4	102.0	103.0
2	104.2	103.3	111.9	119.4	139.2	139.9	101.5	103.6
3	40.7	51.0	108.7	109.3	88.8	104.1	87.6	90.9
4	45.6	57.7	129.7	136.4	N.D. ¹⁾²⁾	N.D. ¹⁾²⁾	86.4	92.5
5	52.5	57.2	153.4	175.9	226.1	253.9	97.4	102.0
6	67.3	83.7	128.3	140.7	82.8 ³⁾	177.0 ³⁾	112.2	124.3
7	68.6	63.5	106.0	106.0	114.1	127.0	87.4	92.3
8	62.0	62.4	126.4	147.1	119.5	144.2	99.6	109.3
9	38.4	37.3	96.7	92.9	155.4	141.3	59.7	60.0

1)~4) See Table 4-1 (1)

Table 4-2 (11) Collaborative study (alfalfa) (continued)

Lab. No	(μg/kg)					
	trifloxystrobin		trifluralin		vinclozolin	
1	121.5	115.7	102.8	107.7	107.7	103.7
2	128.5	121.4	127.5	124.3	114.2	107.7
3	95.3	102.7	101.4	104.7	101.1	104.6
4	161.6	175.0	131.8	142.8	104.0	117.6
5	110.1	123.4	102.2	116.4	94.0	100.9
6	309.3 ³⁾	358.2 ³⁾	108.7	136.4	152.7 ⁴⁾	171.6 ⁴⁾
7	108.7	107.5	86.2	81.1	103.0	96.1
8	113.7	118.6	106.0	105.0	105.0	109.9
9	71.3	70.9	91.4	81.0	52.0 ⁴⁾	49.1 ⁴⁾

1)~4) See Table 4-1 (1)

Table 5 Instruments used in the collaborative study

Lab. No.	GC-MS	Column (i.d.×length, film thickness)
1	Shimadzu GCMS-QP2010	Restek Rtx-5MS (0.25 mm×30 m, 0.25 μm)
2	Shimadzu GCMS-QP2010	Agilent HP-5ms (0.25 mm×30 m, 0.25 μm)
3	Agilent Technologies 6890 5973N	Agilent HP-5ms (0.25 mm×30 m, 0.25 μm)
4	Shimadzu GCMS-QP2010	Restek Rtx-5MS (0.25 mm×30 m, 0.25 μm)
5	Agilent Technologies 6890GC 5975 inert MSD	Agilent HP-5MSi (0.25 mm×30 m, 0.25 μm)
6	Agilent Technologies 6890N 5973	Agilent HP-5MSi (0.25 mm×30 m, 0.25 μm)
7	Agilent Technologies 5890series II plus 5972 series	J&W DB-5ms (0.25 mm×30 m, 0.25 μm)
8	Agilent Technologies 6890N 5973 inert MSD	Agilent HP-5ms (0.25 mm×30 m, 0.25 μm)
9	Agilent Technologies 6890N 5973 inert MSD	Agilent HP-5ms (0.25 mm×30 m, 0.25 μm)

6 まとめ

ガスクロマトグラフ質量分析計による飼料中の農薬の定量法の繰返し精度及び再現精度を確認するため、成鶏飼育用配合飼料及びアルファルファを用いて 9 試験室において共同試験を実施した。

9 試験室より報告があり、試験成績を解析した農薬の試験室内繰返し精度及び試験室間再現精度は相対標準偏差 (RSD_r 及び RSD_R) として 2.5~48% 及び 6.0~130% であった。

また、平均回収率が 50%~200% であり、なおかつ HorRat が 2.0 以下の農薬は 137 種であった。

謝 辞

共同試験に参加していただいた株式会社島津製作所、全国酪農業協同組合連合会、名古屋市衛生研究所、社団法人日本科学飼料協会、財団法人日本食品分析センター、財団法人マイコトキシン検査協会及び横河アナリティカルシステムズ株式会社の試験室の各位に感謝の意を表します。

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