

Scientific Letters

The Relationship of Serum Calcium to Prolapsed Vagina and Ringwomb

Sir.—We were interested to read the paper by Mr. D. P. Stubbings on the Relationship of Serum Calcium to Prolapsed Vagina and Ringwomb in Sheep (*Vet. Rec.* (1971), 89, 296-300).

A survey was carried out by ourselves through the Veterinary Clinical Observation Unit, into the aetiology of prolapsed vagina in sheep. The results of this survey, covering several hundred cases, indicated about as many suggested aetiological factors as there were replies to the questionnaire. As no conclusions could be reached, no results were published.

In one of our earlier papers (*Vet. Rec.* (1962), 74, 363-370) investigating the aetiology of true ringwomb in sheep, we reported that the levels of serum calcium were within the normal range in affected animals. It is doubtful whether the variations of serum calcium noted by Mr. Stubbings are physiologically significant, except at the extreme lower limit of normality, when a cervical non-dilatation would be a reflection of myometrial inertia and not, as Mr. Stubbings suggests, due to lack of tone of the smooth muscle of the cervix. If smooth muscle tone of the cervix was decreased, this would lead to an accelerated dilatation of the cervix, since such dilatation is the result of prolonged myometrial activity and not a sphincter relaxation.

It seems likely that true non-dilatation of the cervix can result from the intake of exogenous oestrogens. Of these, there are two probable sources:—

1. Red clover. In several flocks of sheep, showing a high incidence of non-dilatation, it can be shown that they grazed a pasture rich in red clover in mid pregnancy.

2. Some fungi found in herbage and grain are rich in oestrogens.

Fusarium graminearum is one such fungus in this area, which by oestrogen assay, we have shown to be oestrogenic. This fungus species has been incriminated in a vomiting syndrome, and vulval and mammary hypertrophy in pigs in the U.S.A. (*Ann. Rev. Phyt.*, 1966).

In a feeding trial carried out at the Glasgow Veterinary School using *Fusarium graminearum* of known oestrogenic activity, two cases of vaginal prolapse and one case of non-dilatation of the cervix were recorded in the experimental group of 10 ewes. One case of prolapsed vagina occurred in the control group.

This fungoid growth is particularly common where untreated barley is stored in sealed polythene bags in the open air. This growth appears as a pale pink discoloration, usually on the upper surface of the bag contents and close to any punctures in the bag.

The feeding of such contaminated grain to breeding cattle has a potential risk. In one case, the feeding of a grain affected with fungus of oestrogen activity of 2 µg. per 100 g. was the only detectable

factor responsible for a herd calving index dropping from 375 days to over 400 days.

Acknowledgments.—We wish to acknowledge the help of the following in our continuing investigation: Dr. Saba of the Central Veterinary Laboratory for oestrogen assays, Dr. Tarr of Exeter University for identification of cultures, Mr. P. G. Hignett, Dr. Jean Renton of Glasgow University Veterinary School for feeding trials, and the Commonwealth Plant Bureau for reference cultures of *Fusarium graminearum*.

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Yours faithfully,
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Reference

Annual Review of Phytopathology (1966). 4, 171-194.

Persistence of Polychlorinated Biphenyls in the Milk of Exposed Cows

Sir.—Polychlorinated biphenyls (PCB), while commercially available for the past 40 years, were not identified as environmental contaminants until about five years ago. In 1966 Jensen reported on the occurrence of PCB in fish and wildlife. Subsequent reports confirmed their presence in terrestrial and aquatic life forms in Europe (Holmes, Simmons & Tatton, 1967; Jensen, Johnels, Olsson & Otterlund, 1969; Koeman, Ten Noever de Brauw and De Vos, 1969; Presst, Jefferies & Moore, 1970) and North America (Bagley, Reichel & Cromartie, 1970; Duke, Lowe & Wilson, 1970; Risebrough, Reichs, Peakall, Herman & Kirven, 1968). Polychlorinated biphenyls have recently been detected in a large number of foodstuffs and in human milk (Weston, Noren & Anderson, 1970), hair, and adipose tissue (Gustafson, 1970). While human milk samples contained up to 1.0 mg. per kg. fat, as much as 14,000 mg. per kg. could be detected in some wildlife samples (Gustafson, 1970). Platonow, Saschenbrecker & Funnell, 1971) reported on the occurrence of PCB residues in the milk and some tissues of bovines exposed to environmental contamination.

Polychlorinated biphenyls exhibit a number of physical, chemical and pharmacological similarities to the DDT pesticide group, originating with the fact that they share with chlorinated hydrocarbon pesticides strong lipophilic properties, which result in their accumulation in the animal's lipid deposits and consequent concentration along the ecological food chain (Jensen, Johnels, Olsson & Otterlund, 1969).

Chronic toxicity of PCB appears to be of greater significance than acute toxicity. Recent investigations indicate that the hepatotoxic action of PCB, if considered to be a primary effect, is in its pharmacological significance surpassed by a number of secondary but highly alarming effects, such as the induction of a microsomal enzyme activity leading



FIG. 1.—Chromatograms of Aroclor 1254 standard (upper tracing) and of the same compound recovered from the urine of one of the experimental animals (lower tracing).

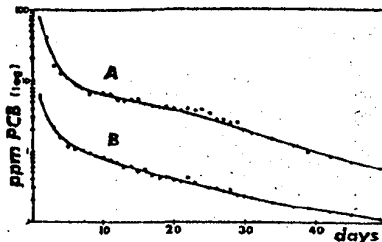


FIG. 2.—The concentrations of polychlorinated biphenyls in milk after the administration of 10 mg/kg. (A) and 100 mg/kg. (B), respectively.

to an accelerated metabolism of drugs, insecticides and other foreign substances. In addition, PCB causes the activation of some organophosphate pesticides to more potent enzyme inhibitors and finally as recent evidence suggests, PCB may bring about steroid degradation, which can lead to altered endocrine relationships (Gustafson, 1970). Unlike other substrates PCB is not converted to a water-soluble form upon enzyme activation and thus is not readily eliminated from the system. The enzyme induction activity of PCB is therefore present for a relatively long time.

In view of the aforementioned lipophilic character of PCB, the excreted levels in the milk of lactating cows as a logical route of elimination were investigated and compared with similarly obtained parameters for urine and faeces.

Two actively lactating Jersey cows, weighing 360 and 390 kg., were given orally 10 and 100 mg. of PCB per kg. of bodyweight, respectively. The PCB were given as a technical grade compound* dissolved in a small amount of olive oil and mixed with dairy concentrate. Milk was collected for up to 50 days after the PCB administration. Total urine, obtained by means of permanently installed catheters, and faeces were collected for two days prior to and seven days after the administration of the PCB.

Polychlorinated biphenyls were extracted from samples and analysed according to a method for

TABLE I.

THE LEVELS (IN $\mu\text{G./G.}$ WET WEIGHT) OF POLYCHLORINATED BIPHENYLS IN THE MILK, URINE AND FAECES OF COWS GIVEN 10 MG./KG. (COW A) AND 100 MG./KG. (COW B) OF POLYCHLORINATED BIPHENYLS, RESPECTIVELY, AND COLLECTED FOR SEVEN CONSECUTIVE DAYS.

Day of collection	Cow A			Cow B		
	Milk	Faeces	Urine	Milk	Faeces	Urine
1	6.27	0.69	0.0035	74.49	7.52	0.0062
2	5.48	0.53	0.0034	42.69	5.35	0.0060
3	2.15	0.45	0.0036	15.97	4.43	0.0059
4	1.57	0.42	0.0035	12.34	4.09	0.0060
5	1.17	0.35	0.0032	10.28	3.60	0.0059
6	1.04	0.36	0.0035	8.82	3.64	0.0061
7	1.06	0.32	0.0034	7.80	3.24	0.0053

chlorinated hydrocarbon pesticides, described by Saschenbrecker & Ecobichon (1968).

Gas chromatographic detection of PCB in both standard and tissue samples by means of a Ni-63 electron capture source revealed a total of 16 distinct peaks which we chose to label in accordance with the number code of Reynolds (1969). The top tracing (Fig. 1) was obtained with a column load of 5 ng. of the PCB compound in heptane, while the lower tracing represents 1 ng. of the same compound recovered from bovine liver. The peaks shown here in ascending numerical order represent various stages of polychlorination of the biphenyl skeleton reaching a quantitatively chlorinated model in decachlorobiphenyl.

One day after the administration of the PCB, the two animals showed concentrations of PCB in milk of 6.27 and 74.45 ppm. These levels were reduced to less than half within three days post-administration, whereafter the milk levels decreased slowly and persisted beyond 50 days. These data are shown in Fig. 2.

The low levels of PCB detected in faeces are indicative of their good absorption from the gastrointestinal tract.

The percentages of the PCB excreted via various routes indicate that by far the major route of excretion of PCB in lactating cows appears to be milk. Indeed, total collection for seven consecutive days of urine, faeces and milk accounted for 9.42 per cent. and 6.06 per cent. of PCB in animals given 10 and 100 mg. per kg., respectively. Polychlorinated biphenyls excreted in milk during seven days accounted for 7.35 per cent. and 4.76 per cent. of the total dose in animals given 10 and 100 mg. per kg. respectively. In both animals urinary excretion of PCB was insignificant, less than one hundredth of 1 per cent. in both animals. The PCB detected in faeces collected for seven days accounted for 2.07 per cent. and 1.30 per cent., which represent 3.5 and 3.6 times less than in the milk of the respective animal.

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* Aroclor 1254, Monsanto Canada Ltd., Toronto, Ontario.

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Yours faithfully,

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Farming Abstracts

Wait Till the Thumbscrews Are On

Many farmers now suffering hardships from the Brucellosis Incentives Scheme should never have gone into it, some veterinary experts claim. Some farmers are continually losing cows after tests and find themselves operating depleted herds, since they are not allowed to buy-in replacements until accreditation. If a farmer calculates that it would cost him more to go into the Incentives Scheme than the incentives offer him, he should wait for compulsory eradication, or clean up bit by bit first and apply to the Incentives Scheme later.

Farmers Weekly. January 14th, 1972.

Chemical Shearing

Further research has been carried out in the U.S.A.

on cyclophosphamide. This chemical, given orally to sheep, constricts the wool fibre at the point of formation and as the wool grows the constricted fibres come to the surface and the entire fleece can then be easily removed. The experiments proved that the fleece should not be left on too long after dosing with cyclophosphamide, since it soon begins to fall off, but, on the other hand, the sheep need some protection from the weather; research is now being concentrated on a way to leave the fleece on until the 21st day after dosing, thereby allowing the sheep to have a protective covering of its own wool. The drug was also shown to be safe for in-lamb ewes and does not affect the quality of the wool.

The Scottish Farmer. January 15th, 1972.

THE VETERINARY SCENE

"It Shouldn't Happen to a Vet"

It must have been 3 a.m. before I reluctantly switched off the light and saved a few chapters for tomorrow. My usual habit of reading in bed had backfired and instead of inducing drowsiness had left me wide awake, reading avidly, quite oblivious of the passage of time.

The opening pages of James Herriot's new book *It Shouldn't Happen to a Vet* (Michael Joseph, £2), are sufficient to conjure up a very real picture of the delightful Yorkshire setting, if only by the unobtrusive use of dialect. Subsequent descriptions of the Dales are so vivid that anyone unfamiliar with this part of the country can hardly fail to appreciate some of its appeal, whether it is mellowed by sunshine, or making a reasonable attempt to be a Siberian winter.

Against this background we are introduced to an astonishing variety of characters. James, the young vet, exuberant but well aware of his own shortcomings takes us with him on the rounds in his

battered, but stalwart little Austin, the survivor of a series of dreadful mishaps. With only a year of experience behind him, James is at the mercy of clients and patients alike. The sometimes vague and exasperating yet paternal figure of Siegfried Farnon, his employer, hovers reassuringly in Skeldale House offering words of aid, comfort, and advice. Tristan, Siegfried's younger brother, steps jauntily from the pages undaunted and unscathed by repeated attempts to destroy anything on wheels!

Times have obviously changed since James's early days in practice, but animals remain the same. They emerge with a clarity that can only result from genuine interest and long observation. The farmers are magnificent. There can be few country vets who have not already met similar characters, under different names, in other parts of the country. Whether or not they can all match the North country imperturbability and genius for understatement, is perhaps debatable. Mr. Clayton certainly deserves an Oscar for his nonchalant performance when James