

Penicillin in Milk Replacements for Dairy Calves.*† (20211)

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Recent reports have indicated that aureomycin will increase growth rates and aid in decreasing the incidence of scours in dairy calves (1-3,5,8,10-16). Other reports indicate that terramycin may stimulate growth to 8 weeks of age (4,6,9,17). In a previous report (7) it was observed that rations supplemented with potassium penicillin resulted in decreased growth and death in dairy calves fed this antibiotic at a level of 0.5 g per 100 lb of milk replacement.

The objective of the trials presented in this report was to study the use of potassium penicillin and procaine penicillin in milk replacements for dairy calves.

Experimental procedure. Six groups of 6 Holstein bull calves each, which were similar in body weight and height at the withers at 6 days of age, were housed in individual solid-walled pens and placed at random throughout the barn so as to reduce as much as possible any positional effects. Weekly body weights and measurements of height at the withers were taken of each calf on the same day of the week and at the same time of day. Daily observations were made of the conditions of the feces. If scours persisted more than 24 hours, an 8 g dose of sulfathalidine was administered orally, followed by an additional 4 g dose at each of the 2 next successive feedings. *Group I* (control) was fed the following milk replacement formula: 50 lb dried skimmilk, 10 lb dried whey, 15 lb distillers' dried corn solubles, 10 lb soluble blood flour, 7 lb dextrose, 5 lb oat flour, 0.5 lb vit. A and D concentrate (4,000 U.S.P. units and 500 U.S.P. units per gram) 0.5 lb trace mineral elements and 2 lb dicalcium phosphate. During the milk replacement feeding period the control replacement was supplemented as follows: *Group I* (control) received no antibiotic

supplement, *Group II* received 0.5 g potassium-penicillin; *Group III* received 0.1 g procaine-penicillin; *Group IV* received 0.3 g procaine-penicillin; *Group V* received 0.9 g procaine-penicillin; *Group VI* received 2.7 g procaine-penicillin per 100 lb milk replacement, respectively. The *milk replacements* were dissolved in water at 100°F and were fed from open pails placed in the concentrate box located 16 in. above the floor of the pen. The rate of feeding (twice daily) was: first through 5th day—dam's milk; 6th through 10th day—2 lb whole milk, 0.2 lb milk replacement, 2 lb water; 11th through 28th day—0.5 lb milk replacement and 5 lb water; 29th through 42nd day—0.6 lb milk replacement and 6 lb water; 43rd through 49th day—0.7 lb milk replacement, 7 lb water; and 50th through 56th day—(once daily) 0.7 lb milk replacement, 7 lb water. All groups of calves were fed *ad libitum* a good quality timothy-alfalfa hay during the trial. Calf starter diet was fed *ad libitum* until each calf was able to consume the maximum of 6 lb daily for the duration of the 12-wk trial. The calf starter was prepared as follows: 416 lb ground yellow corn meal, 300 lb wheat bran, 400 lb crimped whole oats, 100 lb linseed oil meal, 300 lb soybean oil meal (44% protein), 150 lb dehydrated alfalfa meal, 100 lb cane molasses, 100 lb dried skimmilk, 100 lb distillers' dried corn solubles, 10 lb dicalcium phosphate, 10 lb ground limestone, 10 lb iodized salt, and 4 lb vit. A and D meal (1,814,544 U.S.P. units of vit. A and 226,800 U.S.P. units vit. D₂ per lb).

Experimental results. The data relative to growth expressed as gain in weight and increase in height at the withers are presented in Table I. In consideration of these data, it should be remembered that the calves received the antibiotics only until they were 8 weeks of age. It may be noted that the control group consistently gained in body weight at a more rapid rate than did any of the penicillin-fed groups. Similar results were obtained also in

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TABLE I. Effect of Potassium Penicillin and Procaine Penicillin upon Mean Daily Gains in Body Weight and Withers Height of Holstein Male Calves. 6 groups.

Supplementa- tion/100 lb milk replacement	Gain in body wt, lb			Incr. in height at withers, cm			Incidence of scours, Da/calf
	0-4 wk	0-8 wk	0-12 wk	0-4 wk	0-8 wk	0-12 wk	
Control (none)	1.13	1.39	1.63	.16	.15	.20	5.5
.5 g K.p.*	.75	.95	1.18	.14	.12	.13	15.0
.1 g p.p.	.90	1.27	1.45	.12	.12	.15	8.0
.3 g p.p.	.83	.93	1.11	.11	.13	.12	10.5
.9 g p.p.	.97	1.23	1.38	.11	.12	.14	10.6
2.7 g p.p.	.76	1.04	1.26	.10	.11	.14	10.6

* K.p. = potassium penicillin; p.p. = procaine penicillin.

TABLE II. Supplementation of Milk Replacements with Potassium Penicillin and Procaine Penicillin and a Summary of Calf Starter and Hay Consumption of Holstein Male Calves. 6 groups.

Supplementa- tion/100 lb	Avg starter consumption/calf, lb		Starter consumed/ lb gain, lb		Avg hay consumption, lb	
	0-8 wk	0-12 wk	0-8 wk	0-12 wk	0-8 wk	0-12 wk
Control (none)	80	233	1.02	1.86	32	67
.5 g K.p.*	85	232	1.58	2.55	17	50
.1 g p.p.	89	239	1.26	2.13	16	47
.3 g p.p.	86	231	1.65	2.69	23	95
.9 g p.p.	92	232	1.34	2.18	19	52
2.7 g p.p.	84	225	1.44	2.32	27	67

* K.p. = potassium penicillin; p.p. = procaine penicillin.

respect to skeletal growth as measured by height at the withers. The potassium penicillin-fed group gained in body weight at a very slow rate until they were 8 weeks of age but then grew at a rate comparable to the control group from 8 through 12 weeks of age. A similar comparison could be made between these groups in respect to growth in height at the withers to 8 weeks of age, but after the age of 8 weeks the potassium penicillin group continued to grow at a very slow rate until they were 12 weeks of age. It appears that the calves in this group (II) gained more rapidly in body weight on a relative basis than in skeletal growth during the last 4 weeks on the trial.

The groups fed procaine penicillin increased in weight, more slowly, than the controls but were superior to those receiving the potassium salt of the antibiotic, except for Group IV (0.3 g procaine penicillin/100 lb of milk replacement) during the first 8 weeks. After the calves were 8 weeks of age and no longer received their respective antibiotic, their rates of gain in body weight increased greatly, as will be noted in Table I. During this latter period the gain of the control group, however, was still superior. The calves receiving pro-

caine penicillin grew in height at the withers at a much slower rate than their controls, as shown by the data in Table I. This was true throughout the entire 12 weeks feeding period.

No deaths occurred in any of the groups of calves used in this trial. In the previous trial (7), several deaths occurred which appeared to be related to the potassium penicillin fed.

A somewhat greater incidence of scours was found in the groups receiving penicillin (Table I). This was especially true of the calves receiving potassium penicillin. In addition, the cases of scours occurring in the calves receiving the penicillins were more severe.

The data relative to feed consumption and feed utilization efficiency are presented in Table II. During the 12 weeks' trial the control group consumed somewhat less starter and was much more efficient in terms of pounds of body weight gained per pound of starter consumed than any of the other groups studied. In general, the procaine penicillin fed groups, with the exception of one group (0.3 g procaine penicillin/100 lb replacement), were more efficient than the potassium penicillin fed group. Although variations in hay consumption were observed between groups when net energy intakes were calculated it did not

affect the relative efficiency of feed utilization as indicated by starter utilization.

Summary. 1. Feeding of 0.5 g of potassium penicillin per 100 lb of milk replacement to Holstein bull calves resulted in a decreased rate of gain in body weight and growth in height at the withers in this experiment. 2. Feeding of 0.1 g, 0.3 g, 0.9 g, and 2.7 g of procaine penicillin also resulted in decreased growth rates in terms of mean gains in body weight and mean increase of height at the withers in this trial.

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Further Studies on Effects of a Small Intestinal Microsomal Fraction Upon Transplantable Tumors.*† (20212)

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In a previous paper(1), we reported results of exposing Gardner lymphosarcoma cell suspensions to a microsomal fraction, prepared by ultracentrifugation, from small intestinal tissue of mice and rats. The active fraction was sedimented at 90,000 x g. Animals inoculated with a mixture of lymphosarcoma cells and intestinal fraction exhibited either delayed tumor development or failure of tumors to

appear within 180 days following inoculation. All control animals, given tumor cell suspensions in saline, developed tumors and died within 28 days.

Results of further work are reported in this paper, including data on effects of the fraction upon two other tumors, the Ehrlich ascites tumor and Yoshida rat ascites sarcoma. Data on the general chemical nature of the fraction are presented also.

Experimental procedure. CBA mice (Strong) were employed as hosts for lymphosarcoma and the Ehrlich ascites tumor. Tissue for subcutaneous inoculation experiments with lymphosarcoma was obtained by briefly comminuting minced tumor in 5 volumes of saline and filtering through gauze. Such suspensions

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