ALFALFA VERSUS PRAIRIE HAY FOR DAIRY CALVES

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INTRODUCTION

Successful dairymen recognize the importance of raising their own herd replacements. Dairymen and research workers disagree as to the kind of roughage that should be fed to young dairy calves. Many dairymen consider legume hay too laxative for young calves, while others have found choice legume hay an excellent source of roughage, even when fed in unlimited amounts.

Since alfalfa and prairie hay are the most common roughages fed by Oklahoma dairymen, this feeding trial was initiated to compare the feeding value of the two hays, when fed to young dairy calves.

To further test the repeatability of other research work, it was also deemed advisable to investigate the possibility of deferring the feeding of hay until calves were two months of age.

REVIEW OF LITERATURE

According to Morrison (15) progressive dairymen and research workers have found roughages necessary for normal growth and development of the dairy calf. Savage and McCay (24) reported that Davenport fed only milk and grain to a dairy calf for a six months period. At the end of the trial period, the animal was consuming one-half bushel of grain daily, but presented an unthrifty appearance.

Morrison and associates (13) obtained excellent growth from feeding limited amounts of whole milk, skimmilk and grass hay. In their skimmilk trials, they found that calves consuming 14 pounds of skimmilk, plus a dry calf starter, gained an average of 1.76 pounds daily. In further trials these workers obtained average gains of 1.52 pounds per day by feeding the same starter and limiting the skimmilk to 10 pounds daily.

Morrison and Rupel (14) studied the value of feeding a maximum of 400 pounds of whole milk, a starter gruel, plus a dry calf starter and alfalfa hay. Their calves gained 1.57 pounds daily up to six months of age. These workers replicated this trial, and obtained an average daily gain of 1.41 pounds. Morrison and Rupel later conducted six trials feeding the same rations as in the previous experiment, using both the gruel and starter as a dry ration, with good quality alfalfa hay. An average daily gain of 1.30 pounds was obtained from these trials. Using the findings from all these trials, the investigators concluded that alfalfa hay was not too laxative for dairy calves and that any scouring that occurred was attributable to other causes than to the legume hay.

Rupel (23) in his work with dairy calves obtained an average daily gain of 1.69 pounds for a six months trial period. The ration consisted of ground corn as the sole concentrate, skimmilk, and good quality legume

hay. He again concluded that legume hay was not detrimental for optimum growth.

Jacobson (8) studied the effect of alfalfa and prairie hay on the growth of young dairy cattle. He fed a ration very low in vitamin A consisting of white corn, rice meal, linseed meal and a mineral supplement. Alfalfa hay was fed ad lib to one group and prairie hay was fed ad lib to two groups. Growth responses were normal, but calving difficulties were noted in the prairie hay groups. The author concluded that prairie hay being low in vitamin A, caused a vitamin A deficiency.

Willard (27, 28) observed that thrifty Holstein calves could be weaned from milk at three months of age, when fed a limited amount of grain and good quality alfalfa hay. He noted that hay consumption varied with the individual, as some of the experimental animals consumed up to 10 pounds of good quality alfalfa hay per day at nine months of age. He concluded that healthy Holstein calves would make satisfactory growth on alfalfa hay alone after they were nine months of age.

Huffman (7) found the feeding value of alfalfa hay and other hay for dairy calves was dependent upon the stage of maturity, cutting and baling procedures, soil type and soil fertility.

Skaggs (25) observed that dairy calves could be fed all the alfalfa hay they would consume, with no apparent ill-effects. He studied other roughages and suggested that non-legume hays should be supplemented with alfalfa leaf meal as a carotene source in the dry starter ration. He also concluded that calves consuming calf starter and pea-green alfalfa hay could be weaned from milk at four weeks of age.

Norton and Eaton (18) found that the quality of hay had a marked effect upon the hay intake, and that consumption fluctuated with the

quality of the hay fed. According to these workers, the quality of the hay is as important in the promotion of growth as the kind of starter that is fed. Norton (16) conducted a feeding trial to determine the comparative feeding value of alfalfa, mixed grass and legume and timothy hay. Three groups of Holstein calves were fed a limit of 350 pounds of whole milk, calf starter not to exceed four pounds per day and the respective hays free choice. He observed that the calves that were fed alfalfa hay consumed greater quantities of the hay and less starter than either of the other groups. The difference in hay consumption of the alfalfa hay group as compared to the timothy group was statistically significant. The growth responses of animals fed alfalfa hay exceeded standards as established by Ragsdale (19). In a similar trial, Richards and coworkers (20) obtained conclusive results that calves receiving either alfalfa or mixed clover hay consumed more hay and less starter and made faster gains than calves that were fed timothy hay. Turk and associates (26) conducted an experiment to compare the consumption of alfalfa, mixed grass and legume and timothy hays that were crushed at the time of cutting. In their work with dairy calves, these investigators observed that field crushing increased the hay consumption. Of all the hay consumed, 65 percent was of the crushed type. They concluded that the field crushed hay was more palatable because of the crushed stems.

Boyer et al. (1), in their work to determine vitamin A levels for dairy calves, concluded that a level of 10 micrograms of vitamin A per 100 ml. of blood plasma was adequate for normal growth. They also found that plasma levels below seven micrograms per 100 ml. of plasma resulted in retarded growth.

Jacobson and associates (9) studied the effects of vitamin A and carotene intake on the carotene and vitamin A depletion time of young calves.

These workers found that calves on limited whole milk diets usually depleted their stores of vitamin A within two to four weeks time. These workers considered calves with vitamin A levels below four micrograms per 100 ml. of blood plasma to be depleted in their stores. However, the work of Ross and coworkers (22) indicated that for optimum growth the critical blood plasma vitamin A concentrations were in the range of six to eight micrograms per 100 ml. of plasma.

Norton and associates (17) conducted a trial to study the value of supplementary vitamins for young calves. Their studies involved approximately 60 heifer calves of several breeds with the normal diets supplemented with vitamins A, D, E, ascorbic acid and B-complex vitamins. These treatments failed to reduce the incidence or severity of scours.

Ronning and Knodt (21) studied the rate of absorption of vitamin A and carotene in an effort to ascertain the time interval at which a maximum concentration of administered nutrients appeared in the blood plasma. Daily administrations of vitamin A and carotene at levels approximating the recommended daily allowance for a four week period resulted in increases of both of the compounds in the blood plasma. However, only a small and temporary increase in the plasma vitamin A level resulted from the daily administration of carotene.

Lundquist and Phillips (11) conducted a series of experiments to determine some of the dietary essentials necessary for the calf in early life. Results of these trials indicated that a low vitamin A plasma content at birth resulted in vitamin A deficiency symptoms shortly after birth. These workers concluded that young dairy calves were not able to convert carotene into vitamin A.

Investigations conducted by Hibbs and Pounden (5) indicated that the development of the rumen in young calves is influenced by the type of ration that is fed. Their results indicated that palatable, high quality hay stimulated the early development of rumen function in the young calf and appeared to have a favorable physiological effect in meeting the vitamin requirements of the animal. Further work by Hibbs and Krauss (6) has shown that feeding large amounts of vitamin A on the third and tenth day to young calves produced a higher-than-normal blood plasma level for a period of 30 days.

Keener et al. (10), in their work with carotene in calf nutrition, observed that vitamin A deficiencies were closely associated with enteritis, diarrhea, pneumonia and other respiratory infections. These abnormalities resulted in a decreased rate of carotene absorption.

In their studies with young calves Gullickson and Fitch (4) fed milk for 30 days, a simple grain mixture and fair to good quality hay, observed less digestive disturbances when cod liver oil was supplemented in the ration. However, no significant differences were noted in the rate of gain and height at the withers between the group fed cod liver oil and those in the check group.

According to Moore and Berry (12) a low vitamin A intake by dairy calves may account for losses due to pneumonia and scours. These workers observed a higher blood plasma vitamin A concentration in calves that were fed lespedeza hay than in calves that were fed no mixed clover or timothy hay. They concluded that some supplementation is needed when poor quality hays are fed to young dairy calves.

Eaton and coworkers (2) studied the value of different forms of alfalfa hay for dairy calves. Calves that were fed artificially dried and pelleted alfalfa hay consumed greater amounts and showed higher blood

plasma vitamin A and carotene levels than calves that were fed field-cured, field-baled hay, or artificially dried and ground hay. These investigators also observed a more rapid vitamin A depletion time in calves that were fed field-cured, field-baled, and artificially dried and ground hays, than in calves that were fed the artificially dried and pelleted alfalfa hay.

EXPERIMENTAL

Alfalfa and prairie hay are the two most common hays that are fed by Oklahoma dairymen. This 16 week feeding trial was initiated to compare the relative merits of the two hays when fed to young dairy calves, as measured by skeletal growth and body weight gain; to determine the effect of deferring the feeding of either hay until the calves were two months of age; and to measure the effect of the total ration on blood plasma vitamin A and carotene levels.

Procedure

Twenty Holstein and Jersey calves, obtained from the college dairy herd, local dairymen and Oklahoma Institutional herds, were assigned by random selection to one of the following groups:

Group I Received alfalfa hay from birth

Group II Received alfalfa hay at the beginning of the ninth week

Group III Received prairie hay from birth

Group IV Received prairie hay at the beginning of the ninth week

The experimental animals were removed from their dams within 48 hours after birth, and housed in individual 3'6" x 5'0" solid-wall pens for the duration of the experimental period. Water was accessible at all times in automatic water cups. In order that accurate feed intake could be determined, wood shavings or sawdust was used for bedding.

All of the calves were fed an average of 375.0 pounds of whole milk obtained from the college Holstein herd. The schedule of daily milk allowance is shown in Table 1. Dry calf starter, as shown in Table 2, was offered the third day and fed ad lib up to a maximum of four pounds daily. The hays were fed in individual racks in sufficient amounts to insure weighbacks. All of the starter and hays offered and refused were weighed at each feeding.

Table 1. Schedule of Milk Allowance by Weeks

	Weeks									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Pounds of milk per day by breed	(lbs.)									
Holstein	6	8	10	8	6	6	5	3	3	-
Jersey	5	6	7	7	6	6	5	4	3	3

Table 2. Calf Starter Formula

Feed constituent	Pounds
Crimped oats	500
Crushed corn	550
Wheat bran	200
Cottonseed meal	400
Dried skimmilk	100
Alfalfa leaf meal	100
Molasses	150
Iodized salt	10
Steam bone meal	20
Total	2030

Chemical analysis of the calf starter and hays were made as shown in Table 3 and the total digestible nutrient intake calculated from Morrison's tables (15).

Growth measurements were made at seven day intervals for bodyweight change, circumference of the chest and height at the withers. Plasma vitamin A and carotene levels were determined at birth and at 14 day intervals thereafter. A definite time schedule of 4:00 P. M. was observed for taking growth measurements and blood samples.

Incidence of scouring and other calf-hood abnormalities were noted and used in evaluating results.

Table 3. Chemical Composition of Feeds

Constituent	Dry matter	Ash	Protein	Ether extract	Crude fiber	N.F.E.	Carotene
	%	%	%	%	%	%	P.P.M.
Calf starter (1st analysis)	88.08	6.48	16.65	4.39	6.72	65.76	8.7
Calf starter (2nd analysis)	90.09	6.33	17.63	4.68	7.45	63.91	5.0
Alfalfa hay	93.14	7.12	14.15	2.01	33.15	43.57	19.4
Prairie hay	93.68	7.97	5.59	1.84	36.51	48.09	6.0

RESULTS

The results of this experiment are shown in Table 4. In terms of total feed and total digestible nutrient intake, all of the calves were relatively consistent, with the exception of two calves. Calf No. 153, Jersey in Group I, consumed a total of 87.5 pounds of alfalfa hay, and only 211.8 pounds of calf starter during the 16 weeks period. Calf No. 165, Jersey calf in Group IV, consumed only 58.8 pounds of prairie hay and 290.1 pounds of calf starter. This starter consumption is comparable to the starter consumption of the Holstein calves in each of the four groups. Both experimental animals were normal, did not scour excessively and made adequate growth responses. The factor of the individuality of the animal arises in variations of this type.

The hay consumption of the Jersey calves fed alfalfa hay was remarkably consistent throughout the trial period. However, the Jersey calves that were fed prairie hay from birth consumed an average of 96.95 pounds of prairie hay as compared to only 58.8 pounds of prairie hay from calf No. 165, that did not receive hay until the beginning of the ninth week.

Holstein calves in Group I that were fed alfalfa hay from birth, consumed an average of 179.77 pounds of hay as compared to 139.6 pounds of alfalfa hay for the Holstein calves in Group II. The Holstein calves in Group III that were fed prairie hay from birth, consumed an average of 140.83 pounds of hay as compared to 111.8 pounds of hay for the Holstein calves in Group IV. On a percentage basis, the Holstein calves that were fed hay from birth consumed 22 and 20 percent respectively more hay than calves that were deferred in their hay feeding until the beginning of the ninth week.

Table 4. A Summary of Feed Consumption, Bodyweight Gain and Efficiency of Feed Conversion

Group	No. & breed	Treatment	Ave. lbs. gain	Ave. lbs. hay	Ave. lbs. starter	Group total lbs.	Lbs. per lb. gain T.D.N.	Ave. daily gain
I		alfalfa at birth						
	1 Jer.		105.00	87.50	211.80	253.32	2.41	0.94
	4 Hol.		156.00	179.77	298.15	1432.88	2.29	1.39
II		alfalfa at 9th week						
	3 Jer.		112.66	89.60	250.03	843.43	2.49	1.01
	2 Hol.		134.50	139.60	295.85	677.71	2.52	1.20
III		prairie at birth						
	2 Jer.		115.50	96.95	236.50	548.25	2.37	1.03
	3 Hol.		147.00	140.83	317.90	1059.36	2.40	1.31
IV		prairie at 9th week						
	1 Jer.		108.00	58.80	290.10	295.17	2.73	0.96
	4 Hol.		140.25	111.80	289.90	1285.17	2.29	1.25

In terms of average daily bodyweight gain, the Holstein calves in Group I, made slightly more daily gain than Holstein calves that were deferred in their hay feeding until the beginning of the ninth week. Calves in Group I made an average daily gain of 1.39 pounds per day as compared to 1.20 pounds per day for the Holstein calves in Group II. Differences in average daily bodyweight gain of all of the other groups were not apparent.

As shown in Table 5, data obtained from growth response comparisons for bodyweight gain, circumference of the chest, and height at the withers indicate that with the exception of bodyweight gain of the Jersey heifer calves, all of the animals were slightly below Ragsdale's Standards. A lack of thrifty growth was noted in all of the animals during the first three weeks of the trial period. All but three cases of scours, as shown in Table 6, occurred during this time. This period of retarded growth may have been influenced by the drafty conditions that existed in the calves' quarters at that time.

Scouring and other calf-hood abnormalities were at a minimum and were not considered problems in this trial.

Plasma vitamin A and carotene levels were determined at 14 day intervals. These values are shown in Tables 7 and 8. On the basis of these analyses, the vitamin A levels for all groups were considered to be below normal, until the last two weeks of the experiment. Deficiency symptoms were expected when the analyses indicated the vitamin A content of the blood plasma to be below four micrograms per 100 ml., but none were observed.

Due to a severe attack of mastitis of its dam, calf No. 145 in Group IV did not receive any colostrum and was administered two ounces of cod

Table 5. Growth Measurement Comparisons

No. of animals	Breed	Sex	Growth measure 16 weeks	Project 787 (lbs.)	Ragsdales standard (lbs.)
7	Holstein	Males	Bodyweight	240.0	269.0
6	Holstein	Females	Bodyweight	227.2	243.0
3	Jersey	Males	Bodyweight	165.0	184.0
4	Jersey	Females	Bodyweight	161.8	158.0
				(Inches)	(Inches)
7	Holstein	Males	Cir. of chest	43.2	43.9
6	Holstein	Females	Cir. of chest	42.2	42.9
3	Jersey	Males	Cir. of chest	37.3	39.4
4	Jersey	Females	Cir. of chest	37.6	38.1
				(Inches)	(Inches)
7	Holstein	Males	Ht. at withers	35.5	36.4
6	Holstein	Females	Ht. at withers	35.6	36.2
3	Jersey	Males	Ht. at withers	32.7	33.6
4	Jersey	Females	Ht. at withers	32.3	32.6

Table 6. Incidence of Scours*

Group	Calf No.	Breed	No. cases of scours	Periods					
				1st	2nd	3rd	4th	5th	6th
I	153	J	1	X					
	38	H	-						
	103	H	1			X			
	200	H	-						
	99	H	1		X				
II	104	J	1				X		
	272	J	1			X			
	95	J	1			X			
	50	H	1			X			
	48	H	1	X					
III	66	J	1	X					
	116	J	2	X		X			
	60	H	1					X	
	203	H	1		X				
	177	H	1				X		
IV	165	J	1			X			
	145	H	1		X				
	149	H	1		X				
	119	H	1			X			
	142	H	1	X					

* X denotes one case scours.

Table 7. Micrograms of Vitamin A per 100 ml. of Blood Plasma

Group	No.	Breed	14 Day Periods 1	2	3	4	5	6	7	8
						Mg/%				
I	1	J	5.56	4.26	3.44	0.30	0.30	2.48	8.18	10.37
	4	H	3.53	2.04	1.35	1.83	5.18	4.63	5.48	8.38
II	3	J	7.50	7.11	5.78	5.31	6.23	8.25	8.85	10.47
	2	H	3.53	3.51	2.53	3.45	3.79	5.59	6.42	6.07
III	2	J	8.85	7.30	5.84	3.00	6.04	8.59	6.16	7.94
	3	H	3.46	2.36	2.95	5.33	6.20	4.40	6.92	8.71
IV	1	J	4.17	0.40	4.32	4.88	7.13	16.70	17.30	9.81
	4	H	19.11	3.85	4.72	3.72	4.13	6.92	7.25	7.36

Table 8. Micrograms of Carotene per 100 ml. of Blood Plasma

Group	No.	Breed	14 Day Periods 1	2	3	4	5	6	7	8
I	1	J	18.50	23.40	35.00	24.00	32.00	39.30	38.90	68.90
	4	H	2.10	11.35	28.50	40.67	61.60	62.47	70.05	75.30
II	3	J	14.46	34.36	32.86	68.06	96.53	95.40	110.60	131.30
	2	H	9.45	25.30	55.45	65.45	76.80	71.40	66.05	94.00
III	2	J	19.65	21.55	40.90	48.45	88.60	82.60	77.25	99.85
	3	H	12.08	27.53	59.03	67.53	89.13	61.70	66.63	102.98
IV	1	J	9.60	3.75	62.40	106.80	84.60	113.30	148.50	137.70
	4	H	12.28	21.02	64.93	92.50	118.40	158.18	138.25	146.18

liver oil on the seventh and 14th days of the trial period in an effort to prevent blindness, scouring and pneumonia. No other attempts were made to increase the blood plasma vitamin A and carotene levels of any of the other experimental animals.

One Jersey calf died with pneumonia during the ninth week of the trial period. A Holstein calf died during the second week of the trial from an injury sustained at birth. Data obtained from these two animals are not included in this report.

DISCUSSION

The total amount of milk and starter consumed by individual animals were essentially the same for each breed. As previously mentioned, consideration must be given for individuality between animals within their respective breed. In general, all of the animals reached their maximum starter allowance during the seventh and eighth week of the experimental period. The schedule of milk allowance for Groups II and IV were adjusted so that each animal received a limited amount of whole milk during the first week that hay was offered.

These data indicate that Holstein and Jersey calves will make satisfactory growth when fed a limit of 375.0 pounds of whole milk, calf starter not to exceed four pounds per day, and good quality alfalfa or prairie hay. However, other workers have found non-legume hays inferior to legume hays for young dairy calves.

Jacobson (8) found prairie hay of low carotene content, and inadequate as the sole roughage for young dairy cattle. The findings of this trial indicated that calves consumed more alfalfa hay than prairie hay, but differences in over all growth measurements of bodyweight gain, circumference of the chest and height at the withers, were not apparent.

The total feed costs were calculated and again no apparent differences between groups were obtained. The total feed costs for each group were: Group I $189.78; Group II $183.83; Goup III $187.28; and Group IV $189.81.

In general, the plasma vitamin A levels were below levels considered to be deficient (1, 6, 12, 22). There is a possible explanation for this fact. The method of analysis used may have given consistently lower values than those reported in the literature which were determined by other methods.

SUMMARY AND CONCLUSIONS

A 16 week feeding trial was initiated to compare the relative merits of alfalfa and prairie hay for dairy calves as measured by skeletal growth and bodyweight gain, the effect of the total ration on blood plasma vitamin A and carotene levels and to determine the effect of deferring the feeding of hay until the calves were two months of age.

1. The data obtained from this experiment indicate that Holstein and Jersey calves will make satisfactory growth when fed a limit of 375.0 pounds of whole milk, calf starter not to exceed four pounds per day, and good quality alfalfa or prairie hay.
2. With the exception of the Jersey calves fed alfalfa hay, both the Holstein and Jersey calves that were fed hay from birth, consumed more hay than those calves that were deferred in their hay feeding until the beginning of the ninth week.
3. Alfalfa hay was not found to be too laxative for normal health in dairy calves, even when offered in unlimited amounts shortly after birth.
4. Differences observed for bodyweight gain, circumference of the chest and height at the withers, that could be attributed to treatment, were not apparent.
5. There were no apparent differences observed in the vitamin A and carotene levels between calves that were fed alfalfa or prairie hay, or between groups that were deferred in their hay feeding until the beginning of the ninth week.

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Table I. Compiled Data for Calf No. 103 Group I

Trial Period: December 22, 1951 to April 12, 1952

7 Day Period	Weight (lbs.)	Ht. withers (inches)	Cir. chest (inches)	Milk (lbs.)	Starter (lbs.)	Hay (lbs.)
0	84	30.00	31.00	-	-	-
1	93	30.25	31.00	38.0	-	-
2	93	30.50	31.00	46.0	0.3	-
3	102	31.00	32.00	66.0	3.1	1.0
4	103	31.00	32.00	58.0	2.8	0.4
5	107	32.00	33.00	44.0	6.4	0.8
6	118	32.50	34.50	42.0	12.5	1.3
7	132	33.00	35.50	42.0	17.9	2.6
8	143	33.25	36.75	33.0	22.6	4.5
9	160	34.25	38.00	3.0	27.2	7.2
10	166	34.25	39.25	-	28.0	12.6
11	174	34.50	39.75	-	28.0	16.6
12	180	35.00	40.25	-	28.0	16.7
13	202	35.25	41.75	-	28.0	21.4
14	208	35.50	42.00	-	28.0	21.1
15	223	35.75	42.50	-	28.0	29.4
16	242	36.25	43.25	-	28.0	34.1
		Totals		372.0	288.8	169.7

Table II. Compiled Data for Calf No. 38 Group I

Trial Period: December 15, 1951 to April 5, 1952

7 Day Period	Weight (lbs.)	Ht. withers (inches)	Cir. chest (inches)	Milk (lbs.)	Starter (lbs.)	Hay (lbs.)
0	90	32.00	32.00	-	-	-
1	90	32.00	32.00	39.9	0.9	-
2	93	32.00	32.00	56.0	2.1	-
3	102	32.00	32.00	60.0	5.3	0.9
4	108	32.00	32.75	68.0	7.4	1.1
5	117	32.50	33.00	54.0	11.2	0.6
6	123	32.50	34.50	42.0	15.4	1.0
7	131	32.50	35.50	42.0	14.7	1.4
8	140	33.00	37.00	12.0	22.2	5.0
9	156	33.25	38.25	-	27.0	5.9
10	160	34.25	39.50	-	28.0	10.4
11	170	34.50	39.75	-	28.0	15.9
12	186	34.50	40.50	-	28.0	14.8
13	181	34.50	41.00	-	28.0	16.7
14	201	35.25	41.25	-	28.0	30.6
15	208	35.25	42.25	-	28.0	32.9
16	237	36.00	43.75	-	28.0	39.3
		Totals		373.9	302.2	176.5

Table III. Compiled Data for Calf No. 200 Group I

Trial Period: January 9, 1952 to April 30, 1952

7 Day Period	Weight (lbs.)	Ht. withers (inches)	Cir. chest (inches)	Milk (lbs.)	Starter (lbs.)	Hay (lbs.)
0	91	30.00	30.00	-	-	-
1	93	30.50	31.00	42.0	-	-
2	101	31.00	32.00	56.0	0.3	-
3	107	31.00	33.00	70.0	0.9	0.6
4	115	31.50	34.00	56.0	4.1	1.5
5	124	32.50	34.15	42.0	7.4	0.8
6	132	32.75	35.00	42.0	12.8	0.9
7	150	33.50	36.00	42.0	17.8	0.9
8	157	33.50	37.25	24.0	20.4	2.5
9	173	34.25	38.00	-	28.0	4.4
10	180	34.75	39.00	-	28.0	7.7
11	185	35.00	39.75	-	28.0	11.4
12	199	35.50	40.75	-	28.0	15.2
13	203	35.75	40.75	-	28.0	19.4
14	216	35.75	41.25	-	28.0	21.1
15	226	36.25	42.75	-	28.0	27.6
16	245	36.50	43.50	-	28.0	38.5
		Totals		374.0	287.7	152.5

Table IV. Compiled Data for Calf No. 153 Group I

Trial Period: January 16, 1952 to May 7, 1952

7 Day Period	Weight (lbs.)	Ht. withers (inches)	Cir. chest (inches)	Milk (lbs.)	Starter (lbs.)	Hay (lbs.)
0	51	27.00	27.00	-	-	-
1	54	27.25	27.00	26.0	-	-
2	58	27.25	27.00	24.5	0.3	-
3	60	27.25	28.00	39.0	1.9	1.0
4	61	27.50	28.25	46.0	2.6	0.1
5	65	28.25	29.25	49.0	3.5	0.3
6	74	29.00	30.50	48.5	4.8	0.3
7	78	29.00	30.75	46.0	7.6	0.1
8	79	29.25	31.00	37.0	5.2	1.0
9	89	29.75	31.50	30.0	7.0	2.6
10	102	30.50	33.00	20.0	15.9	1.0
11	110	31.50	33.75	-	23.0	2.5
12	112	32.00	33.75	-	28.0	3.6
13	116	32.00	35.00	-	28.0	5.2
14	127	32.25	36.50	-	28.0	18.7
15	142	32.50	37.25	-	28.0	25.2
16	156	33.00	37.50	-	28.0	25.9
		Totals		374.0	211.8	87.5

Table V. Compiled Data for Calf No. 99 Group I

Trial Period: January 25, 1952 to May 16, 1952

7 Day Period	Weight (lbs.)	Ht. withers (inches)	Cir. chest (inches)	Milk (lbs.)	Starter (lbs.)	Hay (lbs.)
0	84	29.00	30.50	-	-	-
1	90	29.25	31.00	35.5	-	-
2	100	29.25	32.00	52.0	2.4	-
3	111	29.25	33.00	66.0	7.3	0.9
4	120	30.25	33.25	60.0	8.6	0.5
5	132	31.00	34.00	44.0	11.5	0.4
6	140	31.50	34.25	42.0	17.8	0.9
7	147	32.00	36.00	42.0	20.0	1.8
8	159	32.25	36.50	30.0	24.0	3.9
9	170	33.00	37.50	-	26.3	7.6
10	186	34.00	38.75	-	28.0	10.9
11	192	35.00	39.25	-	28.0	18.5
12	205	35.25	40.50	-	28.0	28.4
13	216	35.50	41.50	-	28.0	34.7
14	230	35.75	42.25	-	28.0	32.7
15	240	35.75	43.00	-	28.0	36.8
16	249	35.75	44.00	-	28.0	42.4
		Totals		371.5	313.9	220.4

Table VI. Compiled Data for Calf No. 104 Group II

Trial Period: November 13, 1951 to March 4, 1952

7 Day Period	Weight (lbs.)	Ht. withers (inches)	Cir. chest (inches)	Milk (lbs.)	Starter (lbs.)	Hay (lbs.)
0	48	26.50	27.00	-	-	-
1	50	26.75	26.75	30.5	-	-
2	53	26.75	26.75	29.0	0.2	-
3	60	26.75	27.00	37.7	5.4	-
4	58	26.75	27.00	27.3	3.7	-
5	67	26.75	27.00	41.5	8.1	-
6	69	26.75	27.50	42.0	10.0	-
7	80	27.50	27.50	42.0	11.6	-
8	92	28.50	29.00	42.0	13.1	-
9	95	28.75	30.00	35.0	17.0	2.5
10	104	30.00	32.00	35.0	15.6	3.9
11	117	30.00	34.00	5.0	21.0	9.2
12	122	30.00	35.00	-	27.8	11.4
13	133	30.50	35.50	-	28.0	19.2
14	144	31.00	36.50	-	28.0	18.4
15	147	31.75	37.00	-	28.0	19.1
16	166	32.25	38.50	-	28.0	21.4
		Totals		367.0	245.5	105.1

Table VII. Compiled Data for Calf No. 272 Group II

Trial Period: November 16, 1951 to March 7, 1952

7 Day Period	Weight (lbs.)	Ht. withers (inches)	Cir. chest (inches)	Milk (lbs.)	Starter (lbs.)	Hay (lbs.)
0	56	26.00	26.00	-	-	-
1	54	26.00	25.25	28.4	-	-
2	56	26.00	25.50	32.2	0.6	-
3	58	26.00	25.75	30.4	1.7	-
4	61	26.00	26.00	31.8	3.0	-
5	63	26.00	26.50	44.2	7.1	-
6	66	27.00	27.00	42.0	9.8	-
7	70	27.50	28.00	42.0	12.6	-
8	77	28.00	29.00	35.0	16.1	-
9	93	29.00	31.00	35.0	17.2	2.4
10	102	29.25	32.50	35.0	19.2	2.3
11	112	30.00	34.00	20.0	24.6	4.9
12	116	30.00	35.00	-	28.0	9.6
13	125	30.50	35.00	-	27.2	7.8
14	142	30.50	36.00	-	28.0	21.1
15	147	31.50	36.50	-	28.0	28.2
16	161	31.75	37.50	-	28.0	22.8
		Totals		371.5	251.1	99.1

Table VIII. Compiled Data for Calf No. 95 Group II

Trial Period: December 2, 1951 to March 23, 1952

7 Day Period	Weight (lbs.)	Ht. withers (inches)	Cir. chest (inches)	Milk (lbs.)	Starter (lbs.)	Hay (lbs.)
0	55	25.50	26.00	-	-	-
1	52	25.50	26.25	28.0	-	-
2	54	25.75	26.50	36.5	-	-
3	55	26.00	26.50	49.0	1.6	-
4	61	27.00	27.50	49.0	4.7	-
5	64	27.50	29.00	41.5	4.2	-
6	72	27.75	30.00	42.0	7.8	-
7	80	28.50	31.25	42.0	11.4	-
8	88	29.00	32.00	42.0	16.0	-
9	98	29.50	32.50	23.0	19.8	1.0
10	107	29.50	33.00	21.0	23.1	1.1
11	122	30.50	34.00	-	24.9	1.2
12	125	31.00	34.25	-	28.0	2.7
13	142	31.25	35.50	-	28.0	9.6
14	150	31.25	36.75	-	28.0	11.8
15	165	32.25	37.00	-	28.0	13.8
16	170	32.25	37.50	-	28.0	22.8
		Totals		374.0	253.5	64.0

Table IX. Compiled Data for Calf No. 50 Group II

Trial Period: November 15, 1951 to March 5, 1952

7 Day Period	Weight (lbs.)	Ht. withers (inches)	Cir. chest (inches)	Milk (lbs.)	Starter (lbs.)	Hay (lbs.)
0	88	27.50	32.00	-	-	-
1	95	29.00	31.00	62.9	-	-
2	106	29.00	31.50	65.8	0.4	-
3	107	29.75	32.00	64.1	3.2	-
4	109	30.00	32.00	51.6	4.7	-
5	120	30.00	32.50	44.0	12.8	-
6	126	31.00	32.50	35.0	17.3	-
7	136	31.50	33.00	31.0	25.2	-
8	147	32.50	34.50	24.0	27.0	-
9	157	33.00	36.00	9.0	28.0	1.8
10	170	33.50	37.25	-	28.0	1.9
11	180	34.25	38.00	-	28.0	4.7
12	186	34.25	38.50	-	28.0	8.7
13	193	34.25	39.00	-	28.0	11.1
14	201	34.50	40.00	-	28.0	21.9
15	215	34.75	40.50	-	28.0	28.1
16	232	35.00	41.50	-	28.0	25.5
		Totals		387.4	314.6	103.7

Table X. Compiled Data for Calf No. 48 Group II

Trial Period: January 25, 1952 to May 16, 1952

7 Day Period	Weight (lbs.)	Ht. withers (inches)	Cir. chest (inches)	Milk (lbs.)	Starter (lbs.)	Hay (lbs.)
0	115	31.50	33.00	-	-	-
1	115	31.50	33.00	35.5	-	-
2	115	31.50	33.00	51.0	1.9	-
3	121	32.00	33.50	66.0	3.1	-
4	130	33.00	34.75	60.0	7.7	-
5	134	33.00	34.75	44.0	4.9	-
6	136	33.00	35.25	42.0	4.9	-
7	147	33.25	36.50	42.0	15.9	-
8	164	33.50	38.00	32.0	22.2	-
9	175	33.75	39.00	-	24.1	0.5
10	184	34.00	40.00	-	24.7	5.7
11	193	34.25	40.25	-	27.7	13.8
12	202	34.25	41.75	-	28.0	20.6
13	216	35.25	42.50	-	28.0	29.0
14	225	36.00	43.25	-	28.0	37.0
15	232	36.25	43.75	-	28.0	35.7
16	240	36.75	44.25	-	28.0	41.3
		Totals		372.5	277.1	175.5

Table XI. Compiled Data for Calf No. 66 Group III

Trial Period: December 8, 1951 to March 29, 1952

7 Day Period	Weight (lbs.)	Ht. withers (inches)	Cir. chest (inches)	Milk (lbs.)	Starter (lbs.)	Hay (lbs.)
0	46	25.50	26.00	-	-	-
1	54	25.75	26.00	31.0	-	-
2	55	25.75	26.00	38.0	1.4	-
3	64	26.50	26.50	49.0	3.5	0.7
4	65	27.00	27.00	49.0	5.3	0.7
5	74	27.50	28.00	49.0	5.8	1.0
6	83	28.25	29.00	42.0	10.3	0.8
7	89	28.75	30.50	42.0	11.5	1.0
8	93	29.00	30.50	30.0	14.6	0.7
9	100	30.00	32.00	24.0	20.2	1.4
10	107	30.50	33.00	18.0	22.9	2.0
11	122	32.00	34.25	-	22.5	2.7
12	135	32.25	35.25	-	28.0	6.4
13	139	32.25	35.50	-	28.0	10.2
14	151	32.25	36.25	-	28.0	12.3
15	160	32.50	36.50	-	28.0	16.7
16	168	32.50	36.75	-	28.0	16.1
		Totals		372.0	258.0	72.7

Table XII. Compiled Data for Calf No. 116 Group III

Trial Period: January 27, 1952 to May 20, 1952

7 Day Period	Weight (lbs.)	Ht. withers (inches)	Cir. chest (inches)	Milk (lbs.)	Starter (lbs.)	Hay (lbs.)
0	47	25.50	25.00	-	-	-
1	50	25.50	26.00	27.1	-	-
2	51	25.50	26.75	39.0	2.1	-
3	54	26.50	27.25	48.0	4.1	0.4
4	56	26.75	25.00	49.0	4.4	0.2
5	68	26.75	29.25	42.5	6.4	0.3
6	73	27.25	30.25	42.0	5.5	0.2
7	76	27.75	31.00	35.0	6.6	1.3
8	88	28.00	31.50	35.0	14.2	4.2
9	96	28.75	32.00	33.0	17.6	7.8
10	102	29.25	32.25	21.0	18.5	10.8
11	110	29.25	33.50	-	16.9	9.0
12	124	29.25	34.75	-	18.1	11.4
13	130	29.50	36.00	-	25.2	16.4
14	140	29.75	36.25	-	21.3	25.2
15	144	30.75	36.50	-	26.8	25.0
16	156	31.75	36.75	-	27.3	27.0
		Totals		371.6	215.0	121.2

Table XIII. Compiled Data for Calf No. 60 Group III

Trial Period: January 8, 1952 to April 29, 1952

7 Day Period	Weight (lbs.)	Ht. withers (inches)	Cir. chest (inches)	Milk (lbs.)	Starter (lbs.)	Hay (lbs.)
0	73	29.00	29.00	-	-	-
1	80	29.25	30.00	42.0	-	-
2	83	30.50	31.00	56.0	0.3	-
3	90	30.50	32.00	70.0	0.6	0.3
4	103	31.00	33.00	56.0	3.8	1.0
5	108	31.25	34.00	42.0	10.1	2.3
6	121	32.00	35.00	42.0	14.5	1.6
7	125	32.50	36.25	42.0	18.1	1.6
8	144	32.75	37.00	26.0	19.8	3.5
9	157	33.25	37.25	-	28.0	3.6
10	163	33.50	38.00	-	28.0	7.4
11	169	34.25	38.50	-	28.0	12.1
12	187	34.50	39.75	-	28.0	15.1
13	192	34.50	40.25	-	28.0	16.9
14	215	35.00	41.50	-	28.0	20.5
15	220	35.50	42.75	-	28.0	27.7
16	233	36.25	43.00	-	28.0	34.7
		Totals		376.0	391.2	148.3

Table XIV. Compiled Data for Calf No. 203 Group III

Trial Period: January 8, 1952 to April 29, 1952

7 Day Period	Weight (lbs.)	Ht. withers (inches)	Cir. chest (inches)	Milk (lbs.)	Starter (lbs.)	Hay (lbs.)
0	77	28.50	29.50	-	-	-
1	78	28.50	29.50	42.0	-	-
2	81	28.75	30.50	56.0	0.3	-
3	93	30.00	31.00	70.0	1.1	0.7
4	104	30.00	32.00	56.0	3.9	2.0
5	108	30.00	33.00	42.0	9.1	1.9
6	120	30.75	34.00	42.0	9.9	1.9
7	125	31.00	35.25	42.0	18.5	2.1
8	144	31.50	35.50	26.0	18.9	3.3
9	156	31.50	36.50	-	28.0	4.3
10	163	32.00	36.75	-	28.0	6.4
11	169	32.25	37.50	-	28.0	9.2
12	185	32.50	38.50	-	28.0	11.2
13	194	32.75	39.00	-	28.0	15.7
14	217	33.00	40.00	-	28.0	17.1
15	220	33.00	41.75	-	28.0	26.6
16	232	33.25	43.00	-	28.0	34.5
		Totals		376.0	285.7	136.9

Table XV. Compiled Data for Calf No. 177 Group III

Trial Period: January 20, 1952 to May 11, 1952

7 Day Period	Weight (lbs.)	Ht. withers (inches)	Cir. chest (inches)	Milk (lbs.)	Starter (lbs.)	Hay (lbs.)
0	76	28.25	29.50	-	-	-
1	83	28.50	29.75	40.0	-	-
2	83	28.50	29.75	59.0	1.4	-
3	82	28.50	29.75	56.0	2.4	0.2
4	90	29.50	31.25	67.0	3.5	0.0
5	92	30.25	32.50	56.0	6.5	0.0
6	109	30.25	33.25	42.0	9.0	0.4
7	128	31.00	34.25	42.0	13.9	0.4
8	142	31.50	34.50	13.0	21.5	1.7
9	148	32.00	36.00	-	22.8	2.4
10	158	32.50	37.25	-	27.8	4.5
11	166	32.75	38.50	-	28.0	7.1
12	169	33.25	39.00	-	28.0	13.3
13	172	33.50	39.00	-	28.0	23.2
14	180	33.50	39.25	-	28.0	26.2
15	190	34.00	39.50	-	28.0	24.7
16	202	34.25	40.75	-	28.0	33.2
		Totals		375.0	276.8	137.3

Table XVI. Compiled Data for Calf No. 165 Group IV

Trial Period: November 17, 1951 to March 8, 1952

7 Day Period	Weight (lbs.)	Ht. withers (inches)	Cir. chest (inches)	Milk (lbs.)	Starter (lbs.)	Hay (lbs.)
0	56	27.00	26.75	-	-	-
1	57	26.50	26.50	26.0	-	-
2	62	26.50	26.50	28.4	1.3	-
3	52	26.50	26.25	24.6	3.5	-
4	62	26.50	26.50	34.3	7.0	-
5	64	27.00	27.00	49.0	8.7	-
6	73	28.00	28.00	49.0	13.0	-
7	77	28.50	29.00	46.5	20.0	-
8	87	29.00	30.00	36.0	21.5	-
9	100	29.00	31.50	35.0	22.2	0.5
10	104	30.00	32.50	35.0	25.4	0.5
11	112	31.00	33.50	10.0	27.5	1.9
12	128	31.50	34.75	-	28.0	2.0
13	135	31.75	35.25	-	28.0	8.1
14	145	32.75	36.25	-	28.0	10.7
15	157	33.00	37.00	-	28.0	13.9
16	164	33.25	38.25	-	28.0	21.2
		Totals		373.8	290.1	58.8

Table XVII. Compiled Data for Calf No. 145 Group IV

Trial Period: October 27, 1951 to February 15, 1952

7 Day Period	Weight (lbs.)	Ht. withers (inches)	Cir. chest (inches)	Milk (lbs.)	Starter (lbs.)	Hay (lbs.)
0	90	31.00	33.25	-	-	-
1	100	30.00	33.00	42.0	-	-
2	100	30.50	33.00	49.0	-	-
3	98	30.00	32.50	57.3	3.2	-
4	108	31.50	34.00	68.2	3.2	-
5	117	31.75	34.50	83.0	8.1	-
6	122	32.25	35.50	62.0	12.2	-
7	136	33.00	36.00	18.0	22.7	-
8	151	33.00	37.00	14.0	25.9	-
9	153	33.00	38.00	-	27.5	3.2
10	168	33.00	38.25	-	28.0	5.5
11	178	33.25	39.00	-	28.0	6.5
12	193	34.00	40.50	-	28.0	11.9
13	201	34.50	41.50	-	28.0	14.3
14	210	34.50	41.75	-	28.0	20.8
15	220	35.00	42.00	-	28.0	27.6
16	230	35.25	43.00	-	28.0	29.4
			Totals	393.5	298.8	119.2

Table XVIII. Compiled Data for Calf No. 149 Group IV

Trial Period: November 3, 1951 to February 22, 1952

7 Day Period	Weight (lbs.)	Ht. withers (inches)	Cir. chest (inches)	Milk (lbs.)	Starter (lbs.)	Hay (lbs.)
0	90	29.25	30.00	-	-	-
1	102	30.00	30.75	45.5	-	-
2	100	31.00	30.50	54.3	0.2	-
3	106	32.00	30.50	64.7	3.0	-
4	109	32.00	31.00	65.8	5.1	-
5	114	32.00	32.00	65.8	5.9	-
6	117	33.00	32.50	37.6	5.5	-
7	131	33.00	33.50	23.0	11.9	-
8	126	33.00	34.00	21.0	15.1	-
9	137	33.0	34.75	9.0	18.1	3.9
10	141	33.00	35.50	-	25.1	4.3
11	167	33.50	37.00	-	28.0	7.2
12	181	34.00	38.00	-	28.0	6.6
13	185	34.00	38.75	-	28.0	11.6
14	196	34.25	40.00	-	28.0	24.8
15	212	34.25	41.00	-	28.0	25.7
16	226	34.50	42.00	-	28.0	12.5
		Totals		386.7	257.9	96.6

Table XIX. Compiled Data for Calf No. 119 Group IV

Trial Period: November 7, 1951 to February 27, 1952

7 Day Period	Weight (lbs.)	Ht. withers (inches)	Cir. chest (inches)	Milk (lbs.)	Starter (lbs.)	Hay (lbs.)
0	100	31.00	29.75	-	-	-
1	102	29.75	31.25	49.4	-	-
2	102	30.00	31.75	65.0	-	-
3	104	30.25	31.75	54.0	2.1	-
4	105	30.75	32.00	54.6	4.0	-
5	110	31.25	32.25	49.4	4.3	-
6	126	31.50	33.50	42.0	11.6	-
7	132	31.50	34.00	38.0	15.8	-
8	142	32.00	34.50	26.9	22.5	-
9	151	32.00	35.50	9.0	26.2	2.8
10	166	32.50	37.00	-	28.0	4.7
11	180	33.25	38.00	-	28.0	9.6
12	190	33.50	39.25	-	28.0	13.6
13	195	33.75	39.50	-	28.0	18.7
14	212	34.00	40.00	-	28.0	25.0
15	226	34.25	41.00	-	28.0	28.0
16	242	34.50	41.50	-	28.0	31.5
			Totals	388.3	281.5	105.6

Table XX. Compiled Data for Calf No. 142 Group IV

Trial Period: December 7, 1951 to March 28, 1952

7 Day Period	Weight (lbs.)	Ht. withers (inches)	Cir. chest (inches)	Milk (lbs.)	Starter (lbs.)	Hay (lbs.)
0	90	32.25	32.00	-	-	-
1	90	32.25	32.00	38.0	-	-
2	94	32.25	32.00	52.0	1.4	-
3	101	32.25	32.25	66.0	3.8	-
4	109	32.25	32.25	62.0	6.9	-
5	118	32.50	33.25	56.0	12.2	-
6	128	33.00	34.50	42.0	19.4	-
7	145	34.25	34.75	42.0	25.7	-
8	155	34.75	36.00	14.0	28.0	-
9	159	35.25	38.00	-	28.0	2.3
10	165	36.00	38.25	-	28.0	6.3
11	181	36.25	39.50	-	28.0	7.3
12	199	36.50	40.00	-	28.0	12.0
13	207	37.00	41.00	-	28.0	20.6
14	211	37.25	41.50	-	28.0	21.4
15	213	37.25	42.00	-	28.0	27.1
16	233	37.75	42.50	-	28.0	28.8
		Totals		372.0	321.4	125.8

Table XXI. Micrograms of Vitamin A per 100 ml. of Blood Plasma

Calf No.	Periods 1	2	3	4	5	6	7	8
145	70.6	1.92	9.05	5.82	7.86	8.4	5.64	3.84
149	49.5	2.81	6.93	4.05	5.04	8.4	5.7	8.94
119	00.0	8.1	2.25	4.02	6.83	5.1	8.43	4.14
104	3.6	10.28	6.42	5.37	5.76	12.6	9.21	11.7
50	6.45	4.98	3.57	6.60	7.29	7.71	6.06	7.22
272	11.55	8.28	8.91	9.45	10.0	8.31	7.65	14.1
165	2.76	4.17	0.4	4.32	4.88	7.13	16.7	13.55
95	7.37	2.79	2.03	1.13	2.93	3.86	9.69	1.59
142	3.91	0.66	1.01	4.79	5.76	5.67	5.07	6.59
66	13.25	10.4	11.39	5.56	8.16	6.18	5.31	9.11
38	7.36	0.5	1.56	0.75	7.95	6.39	1.98	3.73
103	1.18	2.45	1.14	2.37	10.5	5.72	6.39	10.85
60	3.12	2.55	3.81	8.7	4.67	6.86	9.14	11.78
203	6.15	2.72	2.21	4.83	5.45	4.98	7.07	11.00
200	3.96	0.3	2.4	3.9	1.98	0.99	3.08	7.31
153	5.56	4.26	3.44	0.30	0.30	2.48	8.18	10.37
177	0.63	1.82	2.85	2.46	8.49	1.37	4.55	3.35
99	1.64	4.92	0.30	0.30	3.29	5.45	10.5	8.81
48	0.60	2.04	1.5	0.30	0.30	3.48	6.78	8.20
116	4.01	4.20	0.30	0.45	3.93	11.0	7.01	8.25

Table XXII. Micrograms of Carotene per 100 ml. of Blood Plasma

Calf No.	Periods 1	2	3	4	5	6	7	8
145	8.5	14.1	10.8	59.4	81.8	102.0	170.7	163.9
149	5.5	7.8	33.9	79.1	72.3	95.9	129.9	132.45
119	15.9	37.7	91.2	126.8	173.9	181.2	186.9	165.0
104	8.7	41.1	30.2	69.6	110.3	96.9	123.6	133.50
50	18.6	34.5	92.9	119.6	129.6	108.9	91.6	131.70
272	18.6	26.1	44.4	82.5	121.5	140.4	101.7	138.50
165	8.4	9.6	3.75	62.4	106.8	84.6	113.3	143.10
95	16.1	35.1	24.0	52.1	57.8	80.4	106.5	71.4
142	6.48	30.0	89.1	101.4	150.4	122.4	188.7	221.1
66	16.0	26.1	70.2	67.8	123.3	96.9	88.8	129.45
38	3.9	5.25	36.0	38.9	100.5	101.7	92.4	94.15
103	0.0	11.3	20.4	46.8	6.06	58.7	76.4	79.30
60	12.2	23.0	67.7	76.4	65.0	76.4	96.6	145.75
203	21.5	24.0	68.3	78.3	76.4	76.4	64.4	102.40
200	0.15	0.15	37.2	62.4	56.3	42.2	52.7	74.50
153	18.5	23.4	35.0	24.0	32.3	39.3	70.2	68.9
177	2.55	35.6	41.1	47.9	126.0	32.3	38.9	60.80
99	4.35	28.7	20.4	14.6	29.1	47.3	58.7	76.15
48	0.30	16.1	18.0	11.3	24.0	33.9	40.5	71.20
116	18.9	17.0	11.6	29.1	53.9	68.3	65.7	64.4

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