Post-weaning growth and veal production from dairy bull calves receiving different combinations of soybean flour, whey powder and colostrum until weaning

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Five groups of seven Friesian bull calves received different combinations of soybean flour (S), whey powder (W), and preserved colostrum (C) until weaning at 30 days of age. A complete diet was available *ad lib.* from 4 days of age. After weaning, until 3 months of age, only the complete diet and water were available *ad lib.* From 3 to 5 months of age, all calves received lucerne hay and maize meal, both freely available, and water. Average daily gain (kg) during the post-weaning and total experimental periods was 1,15 and 0,96; 1,08 and 0,91; 1,22 and 1,04; 1,25 and 1,06; 1,21 and 1,04 respectively for Treatments 1 – 5. Feed intake during months 2 and 3 (kg/day and percentage of bodymass) for Treatments 1 – 5 respectively, was 2,32 and 3,62; 2,15 and 3,28; 2,40 and 3,48; 2,75 and 3,98; 2,21 and 3,02. Feed intake during months 4 and 5 (kg/day and percentage of bodymass) was 4,44 and 3,39; 4,32 and 3,40; 4,75 and 3,48; 4,96 and 3,50; 4,73 and 3,35 respectively for Treatments 1 – 5. Final mass (kg) and carcass mass (kg) of calves in Treatments 1 – 5 were 168,1 and 79,5; 164,3 and 83,0; 179,7 and 97,3; 181,0 and 94,8; 184,4 and 91,9 respectively. Gross margin per calf was respectively R70,93; R62,29; R81,67; R93,90 and R69,95 for Treatments 1 – 5.

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Vyf groepe van sewe Friesbulkalwers het verskillende kombinasies van sojameel (S), weipoeier (W) en gepreserveerde kolostrum (K) tot op 'n speenouderdom van 30 dae ontvang. 'n Volledige dieet was vryelik beskikbaar vanaf 4-dae-ouderdom. Na speen, tot op 3-maande-ouderdom was slegs die volledige dieet en water beskikbaar (albei vryelik). Vanaf 3- tot 5-maande-ouderdom het alle kalwers lusernhooi en mieliemeel, albei vryelik beskikbaar, en water ontvang. Gemiddelde daaglikse toename (kg) gedurende die naspeense- en totale proefperiode was onderskeidelik 1,15 en 0,96; 1,08 en 0,91; 1,22 en 1,04; 1,25 en 1,06; en 1,21 en 1,04 vir Behandelings 1 – 5. Voerinname gedurende maande 2 en 3 (kg/dag en persentasie van liggaams-massa) vir Behandelings 1 – 5 was onderskeidelik 2,32 en 3,62; 2,15 en 3,28; 2,40 en 3,48; 2,75 en 3,98; 2,21 en 3,02. Voerinname gedurende maande 4 en 5 (kg/dag en persentasie van liggaamsmassa) was onderskeidelik 4,4 en 3,39; 4,32 en 3,40; 4,75 en 3,48; 4,96 en 3,50; 4,73 en 3,35 vir Behandelings 1 – 5. Gemiddelde eindmassa (kg) en karkasmassa (kg) van kalwers in Behandelings 1 – 5 was onderskeidelik 168,1 en 79,5; 164,3 en 83,0; 179,7 en 97,3; 181,0 en 94,8; 184,4 en 91,9. Bruto marge per kalf was onderskeidelik R70,93; R62,29; R81,67; R93,90 en R69,95 vir Behandelings 1 – 5.

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Introduction

Dairy producers are often in doubt regarding the profitability of rearing bull calves. Calves can be marketed for veal production up to about 21 weeks of age and since the veal market in South Africa is not optimally utilized, and veal not regarded as such a luxury as in some other countries, it may be economically feasible to rear and market calves as close as possible to 21 weeks of age. Owing to relatively high pre-weaning feeding costs it may also be preferable if calves are weaned at an early age and fed on high concentrate diets until 5 months of age. According to Gardner & Wallentine (1972); Bouchard, Laflamme, Lachance & Roy (1980); and Latrille, Paré, St-Laurent & Pomar (1983), acceptable veal can be produced with high-energy grain rations. Stiles, Grieve & Gillis (1974) reported that a 12% CP, high-grain ration, fed from 12 weeks of age until calves obtain a bodymass of 200 kg, showed the same results as 15 or 18% CP in the ration. However, CP content of 9,5 – 10% is insufficient, according to Lee & McCoy (1974) and Tinnimit & Thomas (1974).

It has been shown that calves can be reared successfully until weaning age on mixtures of soybean flour, whey powder, and surplus colostrum, with a saving in pre-weaning feeding costs of 67 – 70% when compared to whole milk (Cruywagen & Horn, 1985). It was decided to feed Friesian bull calves (weaned at 30 days of age from mixtures of soybean flour, whey powder and colostrum) until 20 weeks of age on high-concentrate diets to determine the feasibility of veal production from dairy herds.

Procedure

Thirty-five Friesian bull calves were allotted to five treatments in a randomized block design, stratified according to initial mass, which was determined at 2 days of age, after the colostrum feeding period.

The composition of the pre-weaning liquid experimental diets is presented in Table 1.

Feeding procedure during the pre-weaning experimental period and the chemical composition of the liquid diet mixtures were presented in a previous paper (Cruywagen & Horn, 1985). A complete ration (calculated CP and ME values of 21% and 10,4 MJ/kg, respectively), consisting of 48,5% maize meal, 30% high-protein concentrate (42% CP), 20% ground lucerne hay, and 1,5% salt (NaCl), was available *ad lib.* from 4 days of age. All calves were weaned at 30 days of age and were fed individually throughout the trial.

Since the objective of the trial was to determine the effect of the pre-weaning treatments on post-weaning performance, all calves received the same post-weaning treatment, *viz.* free

Table 1 Composition of pre-weaning liquid experimental diets, expressed on a dry matter basis

Component	Treatment 1	2	3	4	5
Soybean flour, %	20	10	20	10	–
Whey powder, %	60	60	40	40	–
Preserved colostrum, %	20	30	40	50	–
Whole milk, %	–	–	–	–	100

Table 2 Chemical composition of dry feed components

Item	Crude protein (%)	Metabolizable energy (MJ/kg)
Lucerne hay	16,5[a]	7,8[b]
Maize meal	10,5[a]	12,4[b]
HPC – 42[c]	42,0[d]	9,5[e]

[a]Laboratory analyzed values
[b]Values on air dry basis and adopted from van der Merwe (1977).
[c]High protein concentrate (42% CP)
[d]Minimum value guaranteed by manufacturers
[e]Value supplied by manufacturers

access to the above-mentioned complete ration until 3 months of age, whereafter lucerne hay and maize meal (containing 3% salt and 1% bone meal) were offered separately and both *ad lib.* until 5 months (20 weeks) of age. Treatments referred to will thus imply pre-weaning treatments.

The chemical composition of the dry feed components is presented in Table 2.

Bodymass gain was determined monthly and roughage-, concentrate and total dry matter (DM) intake weekly.

Four calves from each treatment were randomly selected for slaughtering at 20 weeks of age to determine the effect of pre-weaning treatment on carcass mass, dressing percentage and grading, for veal production. The remaining calves were re-admitted to the herd.

Results and Discussion

Changes in bodymass

Post-weaning and total bodymass gain is presented in Table 3.

Monthly bodymass gain increased gradually from the first to the fourth month post-weaning, except for Treatments 1 and 4, where gain was fairly constant during the last 2 and 3 months respectively. The only significant difference ($P \leq 0,05$) occurred during the second month, where calves in Treatment 4 showed higher gains (39,4 kg) than calves in Treatments 1 and 2 (31,8 and 31,7 kg). Anderson, Khoyloo & Walters (1982), reported bodymass gains of 13,7 and 25,2 kg, respectively, where calves received lucerne and concentrate separately, for periods corresponding to the first and second months of the present study. Donovan, Braun, Littell & Suissa (1983) reported average daily gains (ADG) of 0,68 and 1,01 kg for male dairy calves up to 90 and 180 days of age, respectively.

There were no significant differences in total post-weaning gain, although calves in Treatments 3, 4, and 5 showed better gains than those in Treatments 1 and 2.

Regarding total bodymass gain (from birth to 5 months of age), calves in Treatment 4 showed significantly higher gains ($P \leq 0,05$) than those in Treatment 2 (148,1 vs. 127,5 kg). In Treatments 1 and 2, calves received 60% whey powder and less than 40% colostrum in the pre-weaning liquid diet mixtures, compared to 40% whey powder and at least 40% colostrum for calves in Treatments 3 and 4 (Table 1).

Post-weaning and total gains compared well with results reported by other researchers. Keane & Harte (1982) reported ADG's varying between 0,56 and 0,96 kg in a 112-day trial, for grass-fed calves supplemented with milk replacers and/or concentrates. Fisher (1982) found gains of 0,44 to 0,69 kg/day for calves receiving whole milk from birth to 56 days of age and starter diets with different fibre contents, fed from 7 to 70 days of age. In a trial where calves received all-concentrate rations and rations containing chopped or ground hay, fed from 8 to 20 weeks of age, gains of between 0,53 and 0,73 kg/day were reported (Cummins, Nocek & Polan, 1982).

Feed intake

Complete ration, lucerne hay, maize meal, and total feed intake of calves during the post-weaning and total experimental periods, are presented in Table 4.

Calves in Treatment 4 consumed significantly more ($P \leq 0,05$) of the complete ration during the first 2 months post-weaning than calves in Treatments 2 and 5. During the pre-weaning period these differences were highly significant ($P \leq 0,01$). Schwab, Muise, Hylton & Moore (1982) reported a starter intake of 1,46 kg/day for early weaned calves (Trial 1), and Fisher (1982) reported DM intakes from 0,47 to 0,61 kg/day for calves up to 70 days of age which received milk until 56 days of age.

Complete ration intake, expressed as percentage of bodymass, was significantly less ($P \leq 0,05$) for calves receiving whole milk during the pre-weaning period (Treatment 5) than for calves in Treatments 1 – 4. The difference was highly

Table 3 Post-weaning (4 months) and total (5 months) bodymass gain (kg) of calves (mean of seven per group) with average daily gain (kg) given in brackets

Item	Treatment[c] 1	2	3	4	5	LSD ($P < 0,05$)
Monthly post-weaning gain						
First month	22,5(0,75)[a]	17,9(0,60)[a]	22,9(0,76)[a]	21,2(0,71)[a]	18,5(0,62)[a]	8,25(0,28)
Second month	31,8(1,06)[a]	31,7(1,06)[a]	34,3(1,14)[ab]	39,4(1,31)[b]	35,2(1,17)[ab]	7,02(0,23)
Third month	37,5(1,25)[a]	34,9(1,16)[a]	37,7(1,26)[a]	39,5(1,32)[a]	38,4(1,28)[a]	7,75(0,26)
Fourth month	37,1(1,24)[a]	36,9(1,23)[a]	41,4(1,38)[a]	39,3(1,31)[a]	43,1(1,44)[a]	11,87(0,40)
Total post-weaning gain	128,9(1,15)[a]	121,4(1,08)[a]	136,3(1,22)[a]	139,4(1,25)[a]	135,2(1,21)[a]	19,22(0,16)
Total (pre- and post-weaning) gain	134,6(0,96)[ab]	127,5(0,91)[a]	145,6(1,04)[ab]	148,1(1,06)[b]	145,7(1,04)[ab]	19,64(0,13)

[a,b]Values followed by a common superscript do not differ significantly ($P \leq 0,05$)
[c]Refer to Table 1

Table 4 Complete ration, lucerne hay, maize meal and total feed intake of calves during the post-weaning and total experimental periods (mean of 7 per group)

	Treatment[d]					LSD	
Item	1	2	3	4	5	($P < 0,05$)	($P < 0,01$)
Period: months 2 and 3							
Complete ration intake							
Total (kg)	139,4[ab]	129,1[a]	143,9[ab]	165,1[b]	132,8[a]	31,37	42,51
kg per day	2,32[ab]	2,15[a]	2,40[ab]	2,75[b]	2,21[a]	0,52	0,71
% of bodymass	3,62[ab]	3,28[ac]	3,48[ab]	3,98[b*]	3,02[c*]	0,60	0,82
Period: months 4 and 5							
Lucerne hay intake							
Total (kg)	58,0[ab]	55,4[ab]	55,0[ab]	45,6[a]	68,8[b]	17,38	23,55
kg per day	0,97[ab]	0,92[ab]	0,92[ab]	0,76[a]	1,47[b]	0,30	0,39
% of bodymass	0,75[a]	0,73[a]	0,66[b]	0,53[c]	0,82[d]	0,21	0,30
Maize meal intake							
Total (kg)	208,3[a]	204,0[a]	230,1[ab]	252,0[b]	215,0[a]	36,20	49,05
kg per day	3,47[a]	3,40[a]	3,84[ab]	4,20[b]	3,58[a]	0,60	0,82
% of bodymass	2,64[ab]	2,67[ab]	2,82[ab]	2,97[a]	2,53[b]	0,35	0,48
Lucerne hay and maize meal intake							
Total (kg)	266,3[a]	259,4[a]	285,1[a]	297,6[a]	283,8[a]	44,78	60,68
kg per day	4,44[a]	4,32[a]	4,75[a]	4,96[a]	4,73[a]	0,75	1,01
% of bodymass	3,39[a]	3,40[a]	3,48[a]	3,50[a]	3,35[a]	0,43	0,58
Period: months 2 – 5							
Total post-weaning feed intake (kg)	405,7[ab]	388,5[a]	428,9[ab]	462,7[b]	416,6[ab]	62,89	85,22
Period: months 1 – 5							
Total dry feed intake (kg)	413,0[ab]	394,7[a]	437,9[ab]	473,5[b]	422,0[ab]	64,25	87,07
Total DM (liquid and dry feed) intake (kg)	424,4[ab]	407,2[a]	449,5[ab]	484,8[b]	434,7[ab]	65,00	88,07

[a,b,c]Values with common superscripts do not differ significantly ($P \leq 0,05$)
[*]Values differ highly significantly ($P \leq 0,01$)
[d]Refer to Table 1

significant ($P \leq 0,01$) between calves in Treatments 4 and 5.

Although there were no significant differences ($P \leq 0,05$) in lucerne hay intake between Treatments 1 – 4, calves in Treatment 5 consumed significantly more ($P \leq 0,05$) hay than those in Treatment 4. Hay intake during months 4 and 5 was fairly similar for calves in Treatments 1, 2, and 3. Anderson, *et al.* (1982) reported a hay intake of 0,4 kg/day for calves from 11 to 12 weeks of age, receiving lucerne hay and concentrate separately.

Expressed as percentage of bodymass, lucerne hay intake decreased gradually from Treatment 1 to Treatment 4, while maize meal intake increased from Treatment 1 to Treatment 4. The highest lucerne hay intake (0,82%) and the lowest maize meal intake (2,53% of bodymass) occurred for calves in Treatment 5. It should be mentioned that the ME content of the pre-weaning liquid diets increased gradually from 15,1 (Treatment 1) to 18,8 MJ/kg (Treatment 4), while the ME content of whole milk was 18,4 MJ/kg on a dry matter basis (Cruywagen & Horn, 1985).

Calves in Treatment 4 consumed significantly more ($P \leq 0,05$) maize meal (4,20 kg/day) during months 4 and 5 than calves in Treatments 1, 2, and 5. In experiments where calves were fed lucerne hay and concentrate separately, Anderson, *et al.* (1982) reported a concentrate intake of 1,2 kg/day for calves from 11 to 12 weeks of age. Latrille, *et al.* (1983) reported intakes of 3,6 – 4,1 kg/day of a fattening ration containing either whole maize, barley, or oats for calves during a 100-day post-weaning fattening period.

There were no significant differences ($P \leq 0,05$) in total hay and maize meal intake, expressed as either kg/day or percentage of bodymass, between calves in any of the treatments.

It can be calculated from Table 5 that the mean DM intake during months 4 and 5 for calves in all treatments was 4,6 kg/day or 3,42% of bodymass. Keane & Harte (1982) reported DM intakes varying from 3,7 to 4,3 kg/day, or 2,8 to 3,2% of bodymass, for supplemented grass-fed calves.

The only significant difference ($P \leq 0,05$) in total post-weaning feed intake, as well as total DM intake (months 1 – 5) occurred between calves in Treatments 2 and 4.

Concentrate:roughage ratio and efficiency of feed conversion

Concentrate:roughage (C:R) ratio and efficiency of feed conversion (EFC) are presented in Table 5.

The C:R ratio selected by calves in Treatment 5 (74:26) was significantly lower ($P \leq 0,05$) than that for calves in Treatment 3 (81:19) and highly significantly lower ($P \leq 0,01$) than that for calves in Treatment 4 (85:15). The C:R ratio increased gradually from Treatment 1 to Treatment 4. This phenomenon was contrary to what was expected, since the ME content of the pre-weaning liquid diets increased gradually from Treatment 1 to Treatment 4 as mentioned earlier, and according to Griffiths & McGann (1966), Raven (1970) and Downes, Cruywagen, Smith & Pelster (1982) calves consume less concentrate as the energy content of a milk replacer increases. The only increasing factor in the pre-weaning liquid diets was colostrum, contributing 20, 30, 40, and 50% of the DM in Treatments 1 – 4, respectively (Table 1). There might be some unknown factor in colostrum which stimulates concentrate intake, but no documented evidence could be found.

The EFC ratio, expressed as kg DM intake/kg bodymass gain, was the lowest for calves in Treatment 5 and the highest for calves in Treatment 4 during all the feeding periods (Table

Table 5 Concentrate:roughage ratio and efficiency of feed conversion of calves during the post-weaning and total experimental periods (mean of 7 per group)

	Treatment[d]					LSD	
	1	2	3	4	5	($P < 0,05$)	($P < 0,01$)
Concentrate:roughage ratio selected by calves (months 4 and 5)	78:22[ab]	79:21[ab]	81:19[ac]	85:15[c*]	74:26[b*]	5,97	8,09
Efficiency of feed conversion (kg DM intake/kg gain)							
Months 2 and 3	2,57[ab]	2,60[ab]	2,52[ab]	2,72[b]	2,47[a]	0,22	0,30
Months 4 and 5	3,57[ab]	3,61[ab]	3,60[ab]	3,78[b]	3,48[a]	0,27	0,37
Post-weaning period (months 2 – 5)	3,15[ab]	3,20[ab]	3,15[ab]	3,32[b]	3,08[a]	0,27	0,37
Total period (months 1 – 5)	3,16[ab]	3,21[ab]	3,14[b]	3,28[a]	2,98	0,25	0,34

[a,b,c]Values with common superscripts do not differ significantly ($P \leq 0,05$)
[*]Values differ highly significantly ($P \leq 0,01$)
[d]Refer to Table 1

Table 6 Final bodymass (mean of 7 per group), carcass mass, dressing percentage and grading score (mean of 4 per group) obtained by calves

	Treatment[d]					LSD	
	1	2	3	4	5	($P < 0,05$)	($P < 0,01$)
Final bodymass at 20 weeks of age (kg)	168,1[a]	164,3[a]	179,7[a]	181,0[a]	184,4[a]	20,4	27,6
Carcass mass (kg)	79,5[a]	83,0[ab]	97,3[b]	94,8[ab]	91,9[ab]	17,4	24,5
Dressing percentage	47,3[a]	47,7[a]	48,6[a]	51,8[a]	49,7[a]	5,5	7,7
Grading[c]	8,25[a]	8,00[a*]	10,25[b*]	10,25[b*]	9,50[ab]	1,59	2,22

[a,b]Values with common superscripts do not differ significantly ($P \leq 0,05$)
[*]Values differ highly significantly ($P \leq 0,01$)
[c]Grading score was based on the following scale (X = points scored):
Super: $10 \leq X \leq 12$ Grade 1: $7 \leq X < 10$ Grade 2: $6 \leq X < 7$
[d]Refer to Table 1

6), the difference being significant ($P \leq 0,05$) only for Treatments 4 and 5. The most favourable post-weaning EFC ratios were observed during months 2 and 3, *viz.* 2,57; 2,60; 2,52; 2,72 and 2,47 for calves in Treatments 1 – 5, respectively. Post-weaning EFC ratios (months 2 – 5) and the EFC ratios from birth to slaughter at 5 months of age, compared well with EFC ratios reported by Latrille, *et al.* (1983), *viz.* 2,8 – 3,4 for calves fattened on different grain concentrates.

Final bodymass and carcass data

Final bodymass and carcass data are presented in Table 6.

Although there were no significant differences in final bodymass at 20 weeks of age, there was a tendency for calves in Treatments 3, 4, and 5 to manifest a higher final mass than those in Treatments 1 and 2. Calves in Treatments 3, 4, and 5 also tended to have a higher carcass mass than those in Treatments 1 and 2, the difference being significant ($P \leq 0,05$) for Treatments 1 and 3 only.

There were no significant differences in dressing percentage, with calves in Treatment 1 having the lowest (47,3%) and those in Treatment 4 the highest (51,8%) dressing percentage.

Calves in Treatments 3 and 4 obtained the highest grading score (both 10,25 points) which was significantly higher than that obtained by calves in Treatments 1 (8,25 points, $P \leq 0,05$) and 2 (8,00 points, $P \leq 0,01$). The grading score of calves in Treatment 5 was intermediate and did not differ significantly from any of the other treatments.

Financial aspects

Feeding costs, income, margin above feed costs, and gross margin are presented in Table 7.

Owing to a higher concentrate intake, the highest post-weaning feeding cost was observed for calves in Treatment 4, followed by Treatments 3, 5, 1, and 2. The only significant difference ($P \leq 0,05$) occurred between calves in Treatments 2 and 4.

There was no significant difference in total feeding costs for calves in Treatments 1 – 4, but that of calves in Treatment 5 was significantly higher ($P \leq 0,01$) than for calves in any other treatment.

Total income was calculated individually for each of four calves slaughtered per group and not from mean carcass mass and grading score values for each group as indicated in Table 6. Calculations based merely on mean values in Table 6 will therefore not correspond with total income values in Table 7.

Although Treatment 5 manifested the most promising EFC ratios and resulted in the second highest income (R221,71), the high total feeding costs of calves in this treatment reduced margin above feed costs to R84,98 which was the third highest.

Concerning gross margin, the only significant difference ($P \leq 0,05$) occurred between Treatment 4 (R93,90), being the highest, and Treatment 2 (R62,29), the lowest. Treatments 1 (R70,93), 3 (R81,67), and 5 (R69,95) did not differ significantly from each other or from Treatments 2 and 4. Treatments 3 and 4 were the most promising, and since gross margins summarize the nett result of the trial, these two treatments would be strongly recommended in practice.

In conclusion, Friesian bull calves can be reared successfully for veal production by weaning them at 30 days of age from

Table 7 Feeding costs[c], income[d], margin above feed costs, and gross margin[e]

Item	Treatment[f]					LSD	
	1	2	3	4	5	($P < 0,05$)	($P < 0,01$)
Post-weaning feeding costs (R)	97,54[ab]	93,06[a]	103,10[ab]	109,65[b]	98,99[ab]	14,08	19,08
Total feeding costs (R)	109,00[a]	104,40[a]	115,55[a]	121,81[a]	136,73[b]	15,18	20,57
Total income (R)	176,85[a*]	177,90[a*]	208,42[b]	226,91[b*]	221,71[b*]	31,15	42,21
Margin above feed costs (R)	82,13[ab]	73,49[a]	92,87[ab]	105,10[b]	84,98[ab]	28,68	38,87
Gross margin (R)	70,93[ab]	62,29[a]	81,67[ab]	93,90[b]	73,78[ab]	28,68	38,87

[a,b]Values followed by common superscripts do not differ significantly ($P \leq 0,05$)

[*]Values differ highly significantly ($P \leq 0,01$)

[c]Costs were calculated at the following prices (June 1984):

Pre-weaning liquid diet components: Soybean flour R1,33/kg; Whey powder R0,65/kg; Colostrum (production cost) R0,12/l (R0,80/kg DM); Whole milk R0,34/l (R2,83/kg DM)

Dry feed components: Lucerne hay R180/ton; Maize meal R220/ton; HPC-42 R409/ton

[d]Income was based on carcass mass, grading score and the mean price of veal obtained by auction on the hook (all centres) from January to May, 1984, *viz.* Super: 242,5c/kg; Grade 1: 229c/kg; Grade 2: 162,7c/kg (Meat Board, 1984)

[e]Wages and veterinary expenses of R11,20 per calf was deducted from margin above feed costs, to obtain gross margin. No purchase cost was included for calves.

[f]Refer to Table 1

mixtures of soybean flour, whey powder and surplus colostrum, followed by a fattening period of 4 months on a high concentrate diet until slaughtering at 20 weeks of age. The best results can be expected when the pre-weaning diet mixture contains less than 60% whey powder and at least 40% colostrum on a dry matter basis. Even at the current high prices of feed ingredients, promising gross margins are possible for veal production from dairy herds. Where calves are bought for the purpose of veal production, producers have to consider purchase price thoroughly, since it obviously has a marked effect on gross margin.

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