

EVOLUTION IN THE BIRTH COAT OF F.H. AND M.R.Y. CALVES.

By

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SUMMARY

The object of this study was to evaluate some of the factors affecting calf's hair characters at birth.

Differences in all birth coat characters between sexes, were found to be significant. There were yearly fluctuations in the average weight, and diameter of calf's hair at birth. Variation in hair length was rather large from year to year. Differences between the different years studied, within sex, were significant in all characters, except hair length in M.R.Y. breed. There proved to be small nearly significant differences between birth coats of calves born in different seasons.

In this work the results verify the relation between sires and hair characters of their calves at birth. The differences between sires in most characters were highly significant.

In the case of presence of medulla in birth coat, it seems that it was not affected by any factor studied. At birth nearly all fibres proved to be medullated. There were small insignificant differences in the characters of the coloured and white hairs.

Birth coat characters of F.H. and M.R.Y. calves, were nearly similar, and the differences were not significant.

INTRODUCTION

There are many publications on the hair coat of cattle. Several of them proved the influence of environment and genes on the hair coat. Moreover there are several publications on the wool of sheep relating to environmental and genetic influences. They deal partly with the condition in young lambs. However, no publications were found treating of the hair coat in the new-born calf. So, there is a complete lack of knowledge about the nature of the birth coat of calves. Taking this into consideration, the morphological characteristics of hair fibres at birth in two Dutch breeds :

1. Black-and-White Friesian (F.H.) a.
2. Red-and White breed (M.R.Y.), are the object of the present study.

MATERIAL AND METHOD

The coat characteristic studied include :

1. 90 Friesian (F.H.) calves at birth.
2. 56 Red and White Dutch breed (M.R.Y.) calves at birth.

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The cattle used in this investigation were drawn from the herd (F.H. and M.R.Y.) of the "Laboratorium voor Veeteelt" and "Laboratorium voor Dierfysiologie", Wageningen in the Netherlands. Morphological research was directed towards the following :

1. Weight of hair per unit area. The area chosen here was 14×14 cm.
2. Hair measurements, including :
 - (a) Hair diameter.
 - (b) Hair length.
 - (c) Presence or absence of medulla.

The above measurements were found from samples taken within 1-3 days after birth, during the period of 1960-1962. The first sample was taken in January 1960. The relationship of sex, year, age of dam and season of birth, on coat characters at birth were observed. The four seasons used in this investigation were :

Winter : January - February and March.

Spring : April - May and June.

Summer : July - August and September.

Autumn : October - November and December.

Samples were taken from a unit area of skin (14×14 cm.).

Hair characters of calves were classified according to the different bulls to which the cows were mated.

The samples of hair of the calves at birth were taken from a standard point on the side, approximately half way between the mid-dorsum and the mid-venter in the line of the umbilicus. This area is believed to be the most suitable, as the density of hair in this region is near the average value for all body regions. Carter and Dowling (1954), Schinckel (1958) and Schleger and a Turner (1960), working on different cattle and sheep breeds, proved that the midside position occupies a fairly consistent intermediate place in the range of follicle population values usually found over the skin surface as a whole.

The procedure and the treatment was done as it was in the thesis of Kassab (1964).

In this study observations were made on hairs of various colours in each sample, (Black, White or Black and White in F.H. and Red, White, and red and white in M.R.Y.).

The percentage of partially and completely medullated hairs to nonmedullated ones, was calculated from 50 hairs in each sample. The phenotypic correlation between birth coat characters was noted on calves on calves born in 1963, in the Laboratorium voor Veeteelt.

RESULTS AND DISCUSSION

Sex :

Tables 1 and 2 show that for heifers the average weight of hair at birth was heavier than for bulls. The results reported in these tables show that there are small differences between hair length of the sexes. It can also be observed that the fibre diameter is 0.36 and 1.25 μ larger for heifers than for bulls in F.H. and M.R.Y. breeds, respectively. Differences in these characters were however not found to be significant (Tables 3 and 4).

TABLE 1.—Sex difference in coat characters (F.H. calves at birth).

Year	Males				Females			
	No.	Weight 14×14 cm gr.	Diameter (μ)	length (mm)	No.	Weight 14×14 cm gr.	Diameter (μ)	length (mm)
1960 .	15	5.95	53.03	24.86	23	7.56	54.25	25.12
1961 . .	12	7.04	50.15	29.04	15	6.84	50.90	27.17
1962 . .	16	6.36	50.74	24.63	9	5.64	49.83	23.47
Total	43	6.45	51.30	26.17	47	6.68	51.66	25.25

TABLE 2.—Sex difference in coat characters (M.R.Y. calves at birth)

Year	Males				Females			
	No.	Weight 14x14 cm	Diameter (μ)	Length (mm)	No.	Weight 14x14 cm	Diameter (μ)	Length (mm)
1960 . .	9	6.07	52.82	25.69	9	7.83	55.36	27.34
1961 . .	15	6.95	49.79	29.13	9	6.29	50.02	27.48
1962 . .	5	5.02	49.74	24.22	9	6.27	50.73	27.22
Total	29	6.01	50.78	26.34	27	6.79	52.03	27.34

Year of birth :

Tables 1 and 2 show yearly fluctuations in the average weights of calves hair coat at birth. From these tables, it can be noticed that year of birth is a factor affecting hair diameter at birth. Variations in hair length were rather large from year to year within sex. Variations in these characters, between the different years studied, within sex, were significant and highly significant (Table 3 and 4). These differences might be due to the fact that, between the years there are differences in temperature, sunshine and rainfall. These fluctuations markedly affect the forage available and the comfort of the animals.

TABLE 3.—Analysis of variance for hair weight, diameters and lengths (F.H. calves at birth)

Source of variation	Weight		Diameter		Length	
	D.F.	M.S.	D.F.	M.S.	D.F.	M.S.
Total	89	2.30	89	8.32	89	15.73
Sex	1	7.03	1	20.87	1	5.28
Year within sex	4	8.04*	4	59.26*	4	60.62
Age of dam within year and sex	27	2.96	27	1.86	27	10.33
Season within age, year and sex	26	0.77	26	7.01	26	14.05
Within season	31	2.11	31	8.06	31	16.38

* Significant ($P < 0.05$)

** Highly significant ($p < 0.01$)

TABLE 4.—Analysis of variance for hair weight, diameters and (M.R.Y. calves at birth).

Source of variation	Weight		Diameter		Length	
	D.F.	M.S.	D.F.	M.S.	D.F.	M.S.
Total	55	1.72	55	1.56	55	13.13
Sex.	1	2.83	1	23.47	1	0.18
Year within sex	4	7.36**	4	52.90**	4	30.20
Age of dam within year and sex	24	1.66	24	10.08	24	15.46
Season within age, year and sex	15	1.07	15	6.13	15	5.76
Within season.	11	1.09	11	6.07	11	13.07

** Highly significant (P 0.01)

Age of dam :

Mean values for weight, diameter and length of hair at birth, are given in table 5 where the calves are classified according to age of their dams. It is clear that a small variation in these characters can be observed in the different groups of age of the dams. These small differences within year and sex was not found to be significant (Tables 3 and 4).

TABLE 5.—Relation between calves coat characters at birth and age of dam.

Age of dam	F.H.				M.R.Y.			
	No.	Wt. (gr.)	Dia. (μ)	Len. (mm)	No.	Wt. (gr.)	Dia. (μ)	Len. (mm)
2-2	26	6.28	51.69	25.25	17	5.91	51.15	25.90
2-3	7	6.90	52.69	24.58	6	6.19	52.36	28.27
3-4	13	7.55	51.75	27.17	13	6.57	50.38	27.53
4-5	14	6.98	52.40	25.27	7	6.80	51.89	26.00
5-6	7	6.39	51.21	26.88	7	7.88	51.76	30.52
6-7	23	6.54	51.79	25.58	6	6.92	52.00	27.37

Season of birth :

The results obtained in tables 6 and 7 illustrated that there are small variations between seasons of birth. These variations, within age of dam, year of birth and sex were found not to be significant (Tables 3 and 4). These small variations between season of birth may be due to that, the calves being protected by the uterine wall during prenatal life and are not or only to a small extent affected by weather fluctuations or management in different seasons.

The presence of medulla in the birth coat seems not to be affected by any of the factors studied. During the examination of hairs the structural outlines of the medulla were plainly visible and the medulla appeared as a solid black structure.

TABLE 6.—Seasonal variation in coat characters
(F.H. calves at birth)

Season	No.	Wt. (gr.)	Dia. (μ)	Len. (mm)	Presence of Medulla
Winter	51	6.93	51.78	26.06	99
Spring	28	6.53	52.01	24.70	98
Summer	3	5.28	53.6	24.57	100
Autumn	7	6.32	51.20	27.55	99

TABLE 7.—Seasonal variation in coat characters
(M.R.Y. calves at birth)

Season	No.	Wt. (gr.)	Dia. (μ)	Len. (mm)	Presence of Medulla
Winter	27	6.65	50.84	30.84	100
Spring	13	5.72	55.56	24.75	100
Summer	10	6.27	52.33	25.17	100
Autumn	6	6.17	51.65	29.07	100

In the two breeds some little hairs were observed with discontinuous medulla. There were, however, a very few exceptions in some F.H. hairs without medulla. Tables 6 and 7 summarize the presence of medulla at birth. All M.R.Y. calves hair was medullated, while in F.H. breed the percentage of fibres medullated was nearly 99%.

Coloured hair :

Tables 8 and 9 showed that there are small differences between hair characters in different coloured. The differences between hair fibres from the Black area and white area in F.H. breed were not significant. Also the differences between Red and white hairs in the same area, in M.R.Y. breed were not significant.

The differences between black hairs in F.H. and red hairs in M.R.Y. were 0.14 μ and 0.65 mm. in diameter and hair length respectively, in favour of red hairs. These differences were found not to be significant. All the hairs examined were medullated.

TABLE 8.—Hair characters of F.H. calves at birth according to colours

Black hair				White hair			
No. of hairs	Dia. (μ)	Length (mm)	Medulla %	No. of hairs	Diameter (μ)	Length (mm)	Medulla %
675	49.92	22.21	100	475	50.33	22.04	100

TABLE 9.—Hair characters of M.R.Y. calves at birth according to colours

Red hair				White hair			
No. of hairs	Dia. (μ)	Length (mm)	Medulla %	No. of hairs	Diameter (μ)	Length (mm)	Medu a %
495	50.06	22.86	100	355	50.09	22.61	100

Relation of sire to birth coat :

Results given in tables 10 and 11, verify the relation between sires and hair characters of their calves at birth. These variations between sires may be attributed to the genetic structure of the sire. The results obtained here confirm the finding of Berman and Volcani, (unpublished data), that a large variation in coat characteristics was found between groups of daughters of different sires.

TABLE 10. Relation of sires to the hair characters of their calves at birth (F.H.)

Sires	No. of calves	Weight ((gr.) 14×14 cm	Diameter (μ)	Length (mm)
1	14	6.91	53.2	29.5
2	14	6.72	51.4	24.7
3	10	7.73	52.5	25.3
4	8	7.71	49.6	30.6
5	7	5.54	50.0	24.0
6	7	5.65	49.5	25.3
7	6	6.41	49.0	26.4

TABLE 11—Relation of sires to the hair characters of their calves at birth (M.R.Y.)

Sires	No. of calves	Weight (gr.) 14×14 cm	Dimeter (μ)	Length (mm)
1	10	7.74	51.3	29.3
2	9	6.77	52.0	28.0
3	9	6.37	49.0	26.9
4	7	5.72	51.2	27.3
5	7	5.76	49.6	25.3
6	7	7.17	52.6	27.6

Breed differences

From table 12 it can be noticed that the differences between the two breeds were 0.14 gr. (14×14 cm) and 0.50μ , in weight of hair and hair diameter, respectively, in favour of the F.H. breed. While hair length and medullation were 1.6mm and one percent, respectively in favour of M.R.Y. breed. These differences between the two breeds were not significant. This is in agreement with the observation of Duerden (1927) on wild-sheep, Black-head Persian and Merino sheep, at South Africa, who stated that in lambs the fleece at the natal stage is far more uniform than in adults in the different breeds. This also agrees with the results obtained by Rendel (1954) on Welsh Mountain, Romney and strongwool Merino breeds, that all these breeds produce a remarkably similar birth coat.

TABLE 12. Differences in hair characters of the calves at birth, between the two breeds. (F.H. and M.R.Y.)

Breed	No.	Weight of hair (gr.)	Diameter (μ)	Length (mm)	Presence of medulla %
F.H.	90	6.70	51.9	25.7	99
M.R.Y.	56	6.56	51.4	27.3	100
Differences		0.14	0.5	1.6	1

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تطور الفطاء الشعرى في عجول ماشية الفريزيان
وال M.R.Y. الهولندية

الملخص

أجريت هذه الدراسة بغرض تقدير بعض العوامل التي تؤثر على صفات الشعر عند الميلاد . وقد اتضح عدم وجود فروق معنوية للجنس في كل صفات الشعر عند الميلاد . وقد تبين أن هناك تأثيراً للسنة على وزن وقطر الشعر عند هذا العمر . وكان التباين في طول الشعرة كبيراً من سنة إلى أخرى ، وتبين أيضاً وجود فروق معنوية في داخل الجنس الواحد بين كل السنين المدروسة في جميع الصفات ما عدا طول الشعرة في عجول الـ M.R.P. وكانت هناك فروق بسيطة في الفطاء الشعرى للعجول المولودة في فصول مختلفة . وبينت هذه الدراسة تأثير الآباء على صفات الشعر في العجول عند الميلاد حيث كانت الفروق معنوية بين الآباء في معظم الصفات .

وفي حالة وجود نخاع في شعيرات الفطاء الشعرى عند الميلاد ، كان يبدو أن ذلك لا يتأثر بأى عامل من العوامل التي درست حيث كانت كل الشعيرات تقريباً عند الميلاد ذات نخاع . وكان هناك فرق غير معنوى في صفات الشعيرات البيضاء والملونة . ولم يوجد فرق معنوى بين صفات شعر كل من النوعين المدروسين .