FREQUENCIES OF BLOOD GROUPS IN AMERICAN AYRSHIRE AND BROWN SWISS CATTLE

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Since the first systematic study of blood groups in cattle (Ferguson, 1941), their expansion and elaboration into systems and phenogroups (cf Stormont, 1950; and Stormont, Owen and Irwin, 1951) has permitted their accurate utilization by specialists for parentage tests, diagnosis of freemartins and monozygotic versus dizygotic twins, etc. (Stormont, 1951).

The data accumulated by the Serology Laboratory, School of Veterinary Medicine, University of California at Davis between 15 June 55 and 15 May 62 presented an opportunity to count or estimate the frequency of the blood groups in the various cattle breeds in this country (cf Owen, Stormont and Irwin, 1947; and Raush, Brum, Hines, and Ludwick, 1966). The present report deals with blood group frequencies of the Ayrshire and Brown Swiss breeds.

The numbers tested are not large, and predominately they represent the registered bulls used in artificial insemination. Instead of being a drawback, this may reflect more accurately the phenogroup frequencies of the next generation. The reagents used are essentially those noted by Stormont, Miller, and Suzuki, 1961. However, the subtypes F_1-F_2, V_1-V_2, Z_1-Z_2, and C_3 are not distinguised.

Where applicable, the direct gene count was used, as in the F-V, Z, and R' -S' systems. The square root (i.e. Hardy-Weinberg) method was used in the Z, L, J and N systems, and a modified square root method in the others. The frequencies for the C system phenogroups were omitted with two exceptions. The C phenogroups were derived from parentage cases and some effort was made to indicate the approximate frequency order. The B system phenogroups for which no frequency is given represent those known from dams in parentage cases but not encountered among the bulls.

Results and Discussion

The data is presented in tabular form at the end of this report. The principle alleles or phenogroups in the B system seemingly always constitute well over 50% of those in the population and yet seldon number over a dozen. In both breeds considered here, the first six principle B phenogroups (of 42 in Aryshires and 56 in Brown Swiss) consitiute approximately two-thirds of those in the populations.

The phenogroups U_1H', A_1D_2Z', and M_1 or M_2 are conspicuous ones, although rather rare in most breeds; they are notably absent in these breeds, at least in this sample.

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Table 1

FREQUENCIES OF PHENOGROUPS FROM 231 AYRSHIRE BULLS

	B System	Phenogroup Frequency
1.	O_1A'	.219
	-	.13
	BO_1Y_2D'	.119
	O_1	.089
	$O_xY_1E'_3G'Y'$	.058
	$QO_3J'K'O'7$	.041
	$B_2GO_xI'O'$	.026
	GO'	.026
10.	$E'_3G'I'$	.026
	PI'	.019
	O_xY_2A'	.015
	$B_2GO_1Y_2$	.015
	I'	.011
	$O_xE'_3G'$	.009
	$Y_1E'_3G'$	.009
	GO_1	.009
	$O_1T_1E'_3F'K'$	.009
	BO_1	.006
20.	BP	.006
	$GY_2E'_1$	.006
	$O_3J'O'7$	.006
	$O_xA'O'$	.009
	$O_xT_1Y_1A'E'_3G'$	.006
	QE'_3F'	.006
	$BO_2Y_1A'E'_3G'$	.006
	$O_xE'_3$	.004
	BO_x	.004
	Y_2	.004
30.	$BGKO_xE'_2F'O'7$	.002
	$BGKO_xY_2E'_2F'O'7$	.002
	$BGKO_xA'E'_3O'$	.002
	$GID'G'$	.002
	B_2GI	.002
	$O_1E'_1$	.002
	O_1Y_2A'	.002
	$O_3J'K'O'7$	.002
	$GO_1Y_2D'G'$	
	$Y_1E'_3G'I'$	
40.	T_1B'	
	$BO_3J'K'O'7$	
	Q	

	C System	
	C_2W	
	C_1EW	
	C_1E	
	X_2	
	-	.09
	X_1	.02
	X_2L'	
	W	
	E	
	C_2E	

	C System (cont.)	Phenogroup Frequency
	C_1EWX_2	
	C_2	

	F-V System	
	F	.823
	V	.177

	Z System	
	Z	.246
	-	.754

	S System	
	H'	.554
	-	.352
	SH'	.073
	U_2	.021

	A System	
	D	.402
	A_1D	.318
	A_1H	.140
	A_2D	.115
	A_2DH	.014
	A_1DH	(.011)

	L System	
	-	.649
	L	.351

	J System	
	-	.750
	J	.250

	M System	
	-	1.00
	M	.00

	N System	
	-	.772
	N	.228

	R'-S' System	
	S'	.843
	R'	.157

Table 2

FREQUENCIES OF PHENOGROUPS FROM 396 BROWN SWISS BULLS

	B System	Frequency	C System	Frequency
1.	$O_1T_1Y_2E'_3F'$	.3674	C_1EW	
	$BO_2Y_2A'E'_3G'Y'$	.0985	C_2W	
	$BPY_2G'Y'$	.0505	X_2	
	O_xO'	.0480	W	
	$BGKO_xE'_2F'O'7$	.0429	C_2ER	
	$BI_2O_xA'D'G'$	.0354	C_1ER	
	E'_1	.0290	C_1E	
	B_2GO_xO'	.0253	EL'	
	$O_xE'_3F'G'O'$	.0215	C_1	
10.	I	.0202	RWX_2	
	BO_1QT_1	.0139	C_1EWX_2	
	I'	.0126	WX_1	
	$BO_2Y_1A'E'_3G'$	.0126	WX_2	
	IY_1Y'	.0114	C_2EWX_2	
	$Y_2I'Y'$	.0101	C_2EWL'	
	B_2G	.0101	C_1RW	
	$O_xE'_3$	.0076	F-V System	
	BIO_x	.0076	F	.644
	$BGKO_xA'B'O'$	.0063	V	.356
20.	$BY_2G'Y'$	.0063	Z System	
	$IO_xY_2B'E'_1Y'$	.0063	-	.735
	O_1	.0051	Z	.265
	$Y_2A'D'E'_1$	.0051	S System	
	$GO_1E'_1$	.0051	SH'	.316
	$GY_2E'_1$	.0051	H'	.309
	$O_1T_1E'_3F'K'$	.0038	-	.269
	O_xQI'	.0038	U_2	.106
	$BGKO_xY_1A'B'E'_3O'$	.0038		
	$O_1T_1Y_2B'E'_3F'$	.0038		
30.	$BGKO_xY_2E'_2F'O'7$	.0038	A System	
	$O_3A'_2E'_2F'$	.0038	D	.778
	$IY_1E'_1I'$	.0025	A_1D	.063
	$IO_xE'_1$	.0025	A_1H	.062
	PE'_1I'	.0025	A_2D	.057
	$BGKO_xE'_3O'$	.0025	DH	.040
	GE'_3O'	.0025	A_1DH	.000
	$O_xY_1E'_3G'$	.0025	L System	
	E'_1I'	.0013	-	.942
	$O_xY_1A'Y'$	.0013	L	.058
40.	$O_1E'_1$	.0013	J System	
	IQE'_1	.0013	-	.893
	B_2GI	.0013	J	.107
	B_2IY_1I'	.0013	M System	
	$B_2GD'E'_1O'$	.0013	-	1.000
	$I_2Y_2E'_1Y'$	.0013	M	
	BIO_xQ	.0013	N System	
	PI'	.0013	-	.833
	O_xA'	.0013	N	.167
	IY_2Y'	.0013	R'-S' System	
50.	$O_3J'K'O'7$	.0013	S'	.724
	$O_1T_1E'_3F'I'K'$	.0013	R'	.276
	$I_2A'D'G'$	.0013		
	$O_3Y_2G'Y'$	.0013		
	$BO_3I_2A'D'G'$	.0013		
	IG'F'	.0013		
	GY_2B'	.0013		

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