

Supplementary material.

Table S1. Traits of interest for improvement across the location

Traits	Almahal						Fanguso						Mankush						Overall	<i>P</i> value
	R ₁	R ₂	R ₃	R ₄	R ₅	I	R ₁	R ₂	R ₃	R ₄	R ₅	I	R ₁	R ₂	R ₃	R ₄	R ₅	I	I	
Growth and size	18	1	1	0	0	0.33	2	4	1	11	5	0.16	11	9	2	0	0	0.28	0.25	0.000
High milk yield	2	9	6	3	0	0.23	9	6	10	0	0	0.29	13	9	1	1	1	0.31	0.28	0.008
Survival	1	4	9	3	1	0.18	0	0	2	1	0	0.02	1	1	11	3	1	0.14	0.11	0.913
BCS	-	5	4	5	3	0.15	5	2	1	3	1	0.13	-	3	6	10	4	0.16	0.14	0.049
Age at puberty	0	0	0	4	0	0.03	5	4	-	7	0	0.16	0	0	1	5	2	0.04	0.09	0.115
AFC	-	-	-	-	0	0.00	-	-	-	-	0	0.00	-	-	-	-	10	0.03	0.01	1
CI	-	-	-	1	0	0.01	-	-	-	0	0	0.00	-	-	-	0	1	0.00	0	0.157
Color	-	0	-	2	12	0.05	-	1	-	1	10	0.05	-	1	-	2	2	0.03	0.08	0.221
Aggressiveness	-	0	0	2	1	0.02	-	9	8	1	1	0.19	-	0	0	1	1	0.01	0.04	0.014

R = rank, I = index, BCS = body condition score, AFC = age at first calving, CI = calving interval.

Table S2. Pearson correlation of selected traits (upper diagonal) and associated *p* values (below diagonal) for female Begaria cattle

	AFC	BCS	BL	CI	HG	MY	SUR	UD	UL	WA	NL	NC	LL	BW	LMY
AFC		-0.05	0.06	0.06	0.09	-0.20	-0.02	-0.10	0.10	0.04	-0.08	0.09	0.14	0.11	-0.14
BCS	0.4156		0.24	-0.23	0.28	0.33	0.21	0.23	0.07+	-0.51	0.17	0.12	-0.13	0.35	0.27
BL	0.3165	0.0001		-0.18	0.20	0.14	0.05	0.07	0.07	-0.15	0.23	0.05	-0.06	0.60	0.09
CI	0.3143	0.0002	0.0034		-0.06	-0.26	-0.16	-0.09	0.08	0.31	-0.14	0.21	0.37	-0.14	0.03
HG	0.1485	<0.0001	0.0013	0.3297		0.15	0.08	0.17	0.06	-0.11	0.27	0.08	-0.06	0.89	0.10
MY	0.0013	<0.0001	0.0224	<.0001	0.0179		0.23	0.18	-0.06	-0.33	0.14	0.19	-0.40	0.18	0.82
SUR	0.7382	0.0007	0.4264	0.0117	0.2081	0.0002		0.06	0.08	-0.37	0.06	0.17	0.02	0.07	0.23
UD	0.1111	0.0002	0.3019	0.1622	0.0072	0.0043	0.3040		0.25	-0.06	0.16	0.02	-0.18	0.16	0.12
UL	0.1158	0.2554	0.2894	0.1795	0.3379	0.3261	0.2265	<.0001		-0.06	-0.05	-0.04	0.10	0.06	0.01
WA	0.4803	<0.0001	0.0156	<0.0001	0.0700	<0.0001	<0.0001	0.2065	0.3396		-0.07	-0.08	0.11	-0.16	-0.27
NL	0.1903	0.0056	0.0002	0.0286	<0.0001	0.0296	0.3154	0.0121	0.3993	0.2674		0.08	-0.13	0.32	0.06
NC	0.1365	0.0606	0.4002	0.6501	<0.0001	0.0019	0.0076	0.7134	0.5391	0.2290	0.1959		-0.13	0.22	0.11
LL	0.0256	0.0329	0.3766	<0.0001	0.0179	<0.0001	0.7817	0.0034	0.1163	0.0838	0.0350	0.0353		-0.06	0.13
BW	0.0924	<0.0001	<0.0001	0.0306	<0.0001	0.0026	0.2443	0.0100	0.3468	0.0099	<0.0001	0.0003	0.3428		0.13
LMY	0.1263	0.0022	0.8815	0.0002	0.0168	<.0001	0.0037	0.0242	0.2230	0.0014	0.9506	0.1329	0.0319	0.2345	

AFC = age at first calving, BCS = body condition score, BL = body length, CI = calving interval, HG = heart girth, MY = milk yield, LMY = lactation milk yield, SUR = survival rare to yearling, UD = udder depth, UL = udder length, WA = weaning age, NL= neck length, NC = neck circumference, LL = lactation length, BW = body weight.

Table S3. Pearson correlation of selected traits (upper diagonal) and associated *p* values (below diagonal) for male Begaria cattle

	BCS	BL	CC	HG	HW	NL	RW	SC	WA	BW
BCS		0.23	0.19	0.31	0.18	0.22	0.22	0.20	-0.20	0.27
BL	0.0002		0.57	0.69	0.73	0.55	0.56	0.20	-0.10	0.85
CC	0.0025	<0.0001		0.63	0.60	0.51	0.59	0.44	-0.16	0.65
HG	<0.0001	<0.0001	<0.0001		0.73	0.61	0.67	0.49	-0.17	0.96
HW	0.0038	<0.0001	<0.0001	<0.0001		0.56	0.67	0.52	-0.17	0.77
NL	0.0005	<0.0001	<0.0001	<0.0001	<0.0001		0.49	0.52	-0.16	0.63
RW	0.0006	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		0.59	-0.21	0.68
SC	0.0013	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		-0.09	0.53
WA	0.0015	0.1224	0.0112	0.0080	0.0077	0.0103	0.0006	0.1721		-0.14
BW	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0256	

BCS = body condition score, BL = body length, CC = canon circumference, HG = heart girth, HW = height at wither, NL = neck length, RW = rump width, SC = scrotal circumference, WA = weaning age, BW = body weight.