Regulation of androgen receptor mRNA expression in two different skeletal muscles during postnatal development in cattle: possible relation to allometric growth rates

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INTRODUCTION

The effect of testicular sex steroids on muscle growth is evident from the sexual dimorphism in muscle growth. Peripheral hormone concentrations cannot sufficiently explain the overproportional growth of individual muscles; instead varying hormone sensitivities of the muscles themselves might account for the differential growth rates. The present study thus aimed to compare androgen receptor (AR) mRNA expression rates in two different muscles with contrary allometric growth coefficients during postnatal growth in bulls.

MATERIAL AND METHODS

Animals: 17 Montbéliard bulls, slaugthered at 4, 8, 12, 16 months of age (4 or 5 per group).

Muscles: *Semitendinosus* (ST)
Triceps brachii (TB)

AR mRNA quantification:

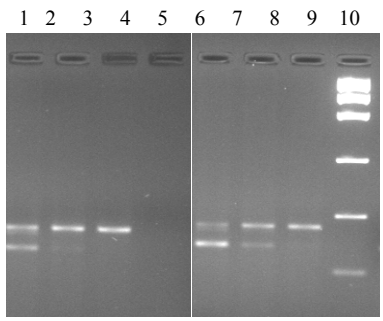
Competitive reverse transcription polymerase chain reaction (RT-PCR), using 200ng of tissue RNA and known dilutions of internal standard cRNA mutant coding for the ligand binding domain (**1**).

I) Separation of co-amplified specimen by gel electrophoresis

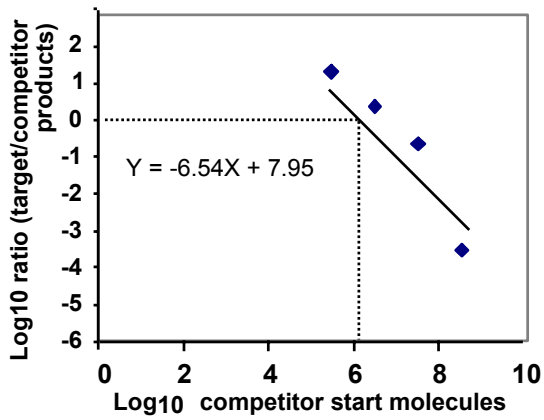
PCR co-amplificates from wild-type (174bp) and standard (134bp) DNA templates.

Decreasing standard cRNA concentrations: 2.24 x10^8, x10^7, x10^6, x10^5 molecules;

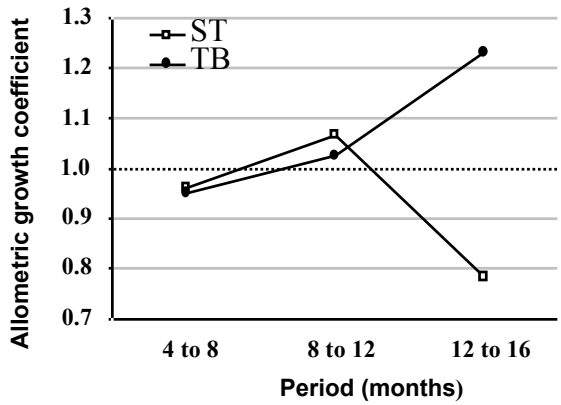
Lane 1 - 4 TB
Lane 6 - 9 ST
Lane 5 negative control
Lane 10 DNA molecular weight standard



II) Determination of the amount of native AR mRNA start molecules in tissue RNA sample (2)



III) Relative growth rates of individual muscles over periods, based on carcass weight



RESULTS

AR mRNA expression rates related per g of tissue

Age (months)	TB (x 10^{10} molecules)	ST	SEM (x 10^9)	Muscle effect (P)
4	6.95	5.86 abc	8.99	0.368
8	6.17	3.89 a	6.97	0.028
12	5.60	3.31 b	6.97	0.028
16	5.51	2.73 c	8.99	0.028

SEM Maximal standard error of least squares-mean

TB showed higher AR expression rates than ST at 8, 12 and 16 months of age. The decrease of AR mRNA with increasing age was significant in ST, as indicated by equal letter indices within a column (a: P<0.10, b: P<0.05, c: P=0.01).

CONCLUSION

These data indicate that androgen action in muscle is regulated rather at the level of the ligand than of the receptor, but is muscle-individually modulated by receptor expression. This mechanism might play an important role for allometric growth phenomena.

References: (1) Malucelli, Sauerwein, Pfaffl & Meyer (1996) J.Steroid Biochem.Molec.Biol. 58: 563-568.
(2) Siebert & Larrik (1992) Nature 359: 557-558.