immune mechanisms of resistance. A negative correlation with bodyweight makes it unsuitable in a breeding scheme. The FEC estimated at 11 months of age is thus best suited to be included in a breeding scheme as there is no conflict with any performance trait and the absence of maternal genetic effects makes its selection favourable. This criterion reflects several mechanisms of resistance, making difficult the adaptation of the parasites against the increasing resistance of the host. In addition, this selection could also be optimized using genetic markers of resistance.

Genes of resistance

The study performed on Creole goats for quantitative trait loci (QTL) associated with GIN is the only one available in this species (de la Chevrotière *et al.*, 2009). A total of 13 genomic regions associated with GIN resistance were detected. Five QTL were significant at the 1% chromosome-wide threshold and the average effect of most QTL exceeds one phenotypic standard deviation. Many QTL were found on chromosomes known to carry candidate genes such as the interferon gamma or the IgE gene. The use of SNP chip will complement these first results and provide a more powerful detection of QTL.

Immune mechanisms

Finding QTL near immunity genes support the hypothesis that the genetic resistance is partly mediated by immunological processes such as proliferation of mucosal mast cells, eosinophils and production of immunoglobulins. Circulating eosinophil counts significantly increased after experimental infection with *H. contortus* in Creole kids along with levels of IgA and IgE (Bambou *et al.*, 2008). Another study showed a higher level of LTCD4+ in susceptible animals and a higher level of circulating lymphocytes B in resistant animals at 35 days post infection (Bambou *et al.*, 2009). These initial results confirm the implication of immune mechanisms in the development of resistance to GIN in Creole goats. IgA and IgE are also under a genetic control as indicated by medium estimates of heritability (unpublished results).

Conclusion

The Creole goat provides interesting results on the genetic resistance of nematode and its mechanisms. It is also a good model for comparison with sheep results. Moreover, the different results obtained are leading directly to practical applications.

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References

Bambou JC, de la Chevrotière C, Varo H, Arquet R, Kooyman FNJ and Mandonnet N 2008. Veterinary Parasitology 158, 311–318.

Bambou JC, Gonzalez-Garcia E, de la Chevrotière C, Arquet R, Vachiéry N and Mandonnet N 2009. Small Ruminant Research 82, 34–39.

de la Chevrotière C, Bishop S, Moreno C, Arquet R, Bambou JC, Schibler L, Amigues Y and Mandonnet N 2009. In Proceedings of 60th Annual Meeting of the European Association for Animal Production.

de la Chevrotière C, Gunia M, Menendez-Buxadera A, Bambou JC and Mandonnet N 2010. In Proceedings of 9th World Congress on Genetics Applied to Livestock Production.

Mandonnet N, Aumont G, Fleury J, Arquet R, Varo H, Gruner L, Bouix J and Vu Tien Khang J 2001. Journal of Animal Science 79, 1706–1712.

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Production traits of St. Croix White and Dorper × St. Croix White ewes in an accelerated lambing system in the tropics

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Over the past several years there has been an increased interest in using Dorper sheep in crossbreeding programs with local sheep breeds in the Caribbean. The Dorper breed was chosen for its heavy muscling in an attempt to increase the growth rate and size of lambs produced for the local market. It has been shown that Dorper × St. Croix White lambs grow faster and yield heavier carcasses than St. Croix White lambs when they are raised on either a concentrate or forage ration after weaning (Dodson *et al.*, 2005; Godfrey and Weis, 2005). The Dorper was developed for an arid environment and is not known for prolificacy, unlike the indigenous hair sheep in the Caribbean that have been selected for a humid environment and are prolific. There is little information on how Dorper × St. Croix White crossbred ewes will perform under tropical conditions found in the Caribbean. The objective of this study was to compare production traits of St. Croix White and

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Dorper × St. Croix White ewes managed in an extensive management and accelerated lambing system in the tropics. The Dorper × St. Croix White ewes were compared to an established St. Croix White flock (average ewe age in October 2003 of 3.5 years) over a period of 4 years (6 lamb crops). Dorper × St. Croix White ewes were introduced into the flock for their first breeding in October 2003 at approximately 7 months of age. Subsequent lamb crops were produced in March and November 2004, July 2005 and March and November 2006 and July 2007. Ewes grazed guineagrass (Panicum maximum) pastures at a stocking rate of 8–10 hd ha^{-1}. Breeding took place in single sire groups within breed with a maximum ram:ewe ratio of 1:20 for a 35-d period each breeding season. Lambs were weaned at 63 d of age.

The St. Croix White ewes had larger litter size than DRPX ewes ($P < 0.03$) but the litter birth weight was similar. The Dorper × St. Croix White ewes had heavier litter weaning weights ($P < 0.0004$) and a higher efficiency ($P < 0.09$) than the St. Croix White ewes. A higher proportion of St. Croix White ewes had multiple births than the Dorper × St. Croix White ewes ($P < 0.08$). Ewe fertility was higher for DRX ewes than for St. Croix White ewes ($P < 0.05$) but there was no difference in prolificacy or fecundity.

Table 1 *Production traits of St. Croix White and Dorper × St. Croix White ewes over a 4-year period*

	Ewe Breed		
Trait	St. Croix White	Dorper × St. Croix White	*P*
Number of lambs born	1.8 ± 0.1	1.6 ± 0.1	0.03
Number of lambs weaned	1.6 ± 0.1	1.5 ± 0.1	n.s.
Litter birth weight, kg	5.2 ± 0.2	5.0 ± 0.2	n.s.
Litter weaning weight, kg	19.6 ± 0.6	22.6 ± 0.6	0.0004
Ewe efficiency, %	46.8 ± 1.5	50.2 ± 1.4	0.09
Multiple lambs at birth, %	69.8	58.6	0.08
Weaning rate, %	85.9	90.9	n.s.
Ewe fertility[a], %	83.8 ± 2.6	92.7 ± 2.9	0.05
Ewe prolificacy[b], %	1.7 ± 0.1	1.6 ± 0.1	n.s.
Ewe fecundity[c]	1.4 ± 0.1	1.5 ± 0.1	n.s.

[a](Ewes lambing/ewes exposed) × 100.
[b]Lambs born/ewe lambing.
[c]Lambs born/ewe exposed.

The Dorper × St. Croix White ewes were able to achieve production rates similar to St. Croix White ewes as they matured as shown by heavier litter weaning weights and greater ewe efficiency. These results indicate that Dorper × St. Croix White ewes can be used in an accelerated lambing system under tropical conditions.

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References

Dodson RE, Weis AJ and Godfrey RW 2005. Post-weaning growth and carcass traits of St. Croix White and Dorper × St. Croix White lambs grazing pasture during the dry and wet seasons in the U.S. Virgin Islands. Sheep & Goat Research Journal 20, 25–31.

Godfrey RW and Weis AJ 2005. Post-weaning growth and carcass traits of St. Croix White and Dorper × St. Croix White lambs fed a concentrate diet in the U.S. Virgin Islands. Sheep & Goat Research Journal 20, 32–36.

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