

Conclusion

The F₁NDce and F₁Mtb seem similar for their physical characteristics whereas they are bigger than the 3/4 Mtb animals. But compared with the both F₁NDce and F₁Mtb, the 3/4 Mtb cows performed the best milk production trends which would be related to exotic gene level increasing.

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Studies on the adaptability of Jersey × Sahiwal crossbred cattle to tropical conditions and their productive performance

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Crossbreeding plays a vital role in the improvement of productive and reproductive performance of native cattle in developing countries like India. The Jersey cattle breed is the breed of choice for crossbreeding as it suits well to the tropical climate of India. In order to bring about Genetic improvement of the crossbred cattle, there is a strong need to produce genetically superior bulls in required members for artificial insemination and natural services. The present work was therefore focused on the establishment of a bull mother farm of proven germplasm of Jersey × Sahiwal crossbred animals so as to supply young breeding bulls of proven germ plasma. Hence there is a need to test the productive performance and adaptability of crossbred animals to tropical conditions in order to establish the farm. The physiological data and results of biochemical analysis of blood samples of twenty-one Jersey × Sahiwal crossbred cows were noted regularly at weekly intervals. The milk production and peak yield were recorded and the milk samples were analysed for fat, protein and solids not fat (SNF).

The mean ± SE values of temperature, pulse and respiration were recorded as 101.53 ± 0.07, 57.88 ± 0.76 and 23.13 ± 0.58 respectively. The mean ± values of biochemical analysis of blood samples were 94.64 ± 2.84, 27.58 ± 1.45, 61.78 ± 1.94, 2.06 ± 0.90, 1.42 ± 0.07, 10.27 ± 0.32, 6.03 ± 0.09, 1.97 ± 0.04, 146.1 ± 3.3 and 4.81 ± 0.11 respectively for SGOT (μ L⁻¹), SGPT (μ L⁻¹), glucose (mg dL⁻¹), urea (mg dL⁻¹), creatinine (mg dL⁻¹), calcium (mg dL⁻¹), phosphorus (mg dL⁻¹), magnesium (mg dL⁻¹), sodium (mg dL⁻¹), and potassium (mg dL⁻¹) respectively which were all in the normal range for the crossbred cows. The mean total milk production (lt) during the lactation and peak yield were 1345.9 ± 0.25 and 9.26 ± 0.12 respectively. The mean fat, protein and SNF percent were 4.90 ± 0.10, 3.67 ± 0.03 and 9.39 ± 0.12 respectively which were all in the normal range. The study suggests that the crossbreds were well adapted to the tropical climate and the bull mother farm can be established successfully so as to supply breeding bulls in surplus in the future to the farmers.

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Temperature-Humidity Index scenarios in the Mediterranean basin

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Introduction

In its 2007 assessment, the Intergovernmental Panel on Climate Change (IPCC) for the first time provided best estimates and likely ranges for global average warming under each of its emission scenarios. Based on plausible emission scenarios, the IPCC estimates that average surface temperatures could rise between 2°C and 6°C by the end of the 21st century. Projected increases in temperature could cause more severe conditions of heat stress in farm animals and also a number of other effects (reduced growth and quality of grassland and crops, water availability, higher diffusion of vector-borne diseases, etc), which may indirectly impair animal health, welfare and performances (Lacetera *et al.*, 2003). The Mediterranean basin has been

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identified as one of the most prominent “Hot-Spots” in future climate change (Giorgi *et al.*, 2006). The work described herein was aimed at describing the climate scenario until 2050 in the Mediterranean basin in terms of the Temperature Humidity Index (THI). THI is an index that combines the values of temperature and humidity into a single value and has been widely used as a measure of thermal stress in livestock.

Material and methods

The Mediterranean basin was delimited by the 10° West and 40° East meridians, 28° and 48° North parallels. This study was carried out using the dataset simulation of the Centre National de la Recherche Scientifique and Institute Pierre Simon Laplace. This simulation, with regional coupled model LMDZ-Med/NEMO-Med8, covers 100 years (1951–2050) and corresponds to the IPCC-A1B scenario. It covers the Mediterranean basin with a spatial resolution of about 35 km. Human land use is not included in these simulations. Air temperature and relative humidity with monthly frequency were extracted from this database to calculate the THI for the next 100 years. The formula used has already been utilized for THI calculation in previous animal biometeorology studies carried out in Mediterranean countries (Bouraoui *et al.*, 2002; Vitali *et al.*, 2009). The Mediterranean basin was characterized on the basis of the mean annual and seasonal THI for CliNo period (1971–2000) and separately for each of the four single decades (2011–2020, 2021–2030, 2031–2040, and 2041–2050), by producing THI maps. Anomalies between decades and CliNo were also evaluated.

Results

Annual and seasonal THI values testified significant differences between western and eastern and between northern and southern areas of the basin (not shown). This is not surprising since the Mediterranean basin is a highly heterogeneous region, with a climate characterized by a great diversity of features due to its unique geographic location: a transition zone between the hot and dry African climate regime in the south, and the mild and humid European climate in the north. Figure 1 shows values of mean values of summer (June, July, and August) THI for the decade 2041–2050. The anomalies throughout the region are positive for all decades, even if they will not affect the different countries of the basin similarly. Table 1 reports mean values of summer THI in the basin and values of the anomalies respect to CliNo. Only values of summer THI are shown because numerous studies have indicated this season as the one with the greatest risk for animal health, welfare and performances (Vitali *et al.*, 2009), and also because THI is particularly suitable to predict the effects of environmental warmth.

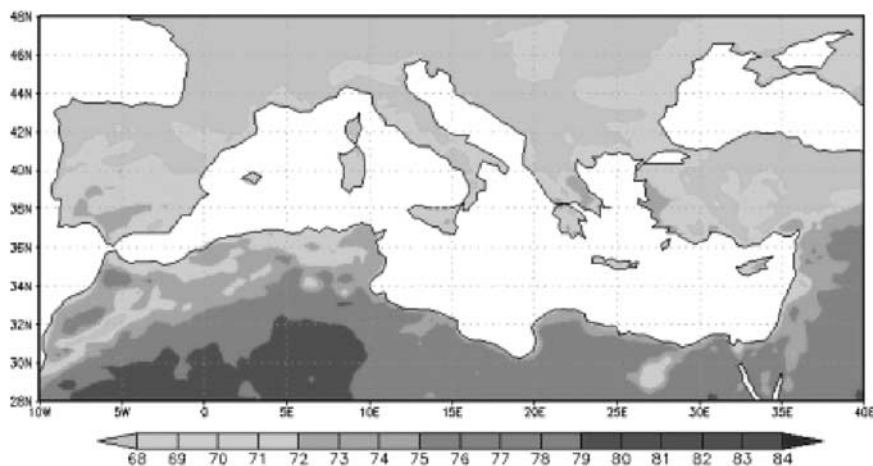


Figure 1 Summer THI for decade 2041–2050.

Table 1 Summer THI values and anomalies

Years	Mean THI	SD	Anomalies vs CliNo
1971–2000	66.6	0.4	–
2011–2020	68.0	0.4	+1.4
2021–2030	68.3	0.2	+1.7
2031–2040	68.5	0.3	+1.9
2041–2050	69.1	0.3	+2.5

Conclusions

These results indicate that the expected warming of the area is likely to increase thermal discomfort of livestock in several regions. This underlines the importance to develop appropriate adaptation strategies (nutritional, environment modifications, genetic selection for thermo-tolerance) to attenuate the negative effects of heat stress in farm animals, considering that the subsistent economies of many countries of the south Mediterranean basin are strongly engaged in that sector. Comprehensive frameworks need to be developed to identify and target

adaptation options that are appropriate for specific contexts, and that can contribute to environmental sustainability as well as to economic development and poverty alleviation.

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Contribution of research to a breeding programme for Creole goats in Guadeloupe

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Introduction

The Creole goat in Guadeloupe is a local meat breed well adapted to tropical climates. This breed came from the natural mixing of goats imported from Africa, Europe and India during slavery. It evolved under natural selection and got adapted to its environment. This small-sized prolific breed shows resistance characteristics to gastro-intestinal nematodes (GIN) (Mandonnet *et al.*, 2006). Farmers want to increase the meat production of this breed. They have expressed a strong willingness to develop a selection scheme for the Creole goat. Breeder organisations, extension services and INRA are collaborating to implement a breeding programme for the Creole goat. An innovating project of selection for production and adaptation traits in the tropics has begun. This was made possible by the previous studies on GIN resistance of Creole goats at INRA.

Farmer survey

As a first step, a survey of goat farmers was conducted by INRA (Gunia *et al.*, 2010a). Herd management was studied. A special emphasis was given to the practices and opinions of farmers that are relevant for the breeding programme. Farmers interested in participating in this project were also identified.

Identification grid of Creole goats

Many crossbreds in Guadeloupe results from uncontrolled mating between Creole and a recently imported breed. A tool was needed to distinguish Creole goats from crossbreds. Phenotypic description of the Creole goats of the INRA experimental flock was conducted. The main traits of the Creole goat were identified and reported on a grid (Mandonnet *et al.*, 2010). This grid was evaluated and adapted by extension services and farmers. In the field, goats are marked according to the grid to determine if they belong to the Creole breed. This grid proved to be an efficient tool to quickly determine if a goat could be considered as Creole.

Selection objective

The definition of the selection goal for the Creole goat is the subject of a PhD at INRA. The originality of the selection objective is to take into account adaptation and production traits. The good maternal qualities and adaptation traits (mainly resistance to GIN) need to be maintained. Maternal qualities ensure that enough kids will be born and reared. Genetic resistance to GIN is also an important trait as parasitism leads to higher pre-weaning mortality and slower growth. Production traits (growth, dressing percentage) will also be improved. They are important traits for farmers who are looking for fast growing heavy bucks for butchery. A bio-economic model of a typical goat farm was created. The economic weight of each trait of the animal was calculated.

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