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Impact of drought on livestock productivity in Morocco

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SUMMARY – The objectives of this study were to determine drought impact on livestock systems and their productivity in the Northern Central Region of Morocco. Data were analyzed according to three Drought Indicators related to Livestock Productivity. Pertinent Drought Indicators are represented by forage yields and animal prices, which decreased with drought, and feed prices which increased in dry years. Fairly pertinent Drought Indicators are represented by flock size and fattened livestock prices which decreased in dry years. Poorly pertinent Drought Indicators, represented by the number of slaughtered animals, were not analyzed because of lack of data. The feed and cereal yields decreased in dry years, whereas purchased feed quantity increased with drought severity. The duration of supplementation increased from 3 months in humid years to 12 months in dry years. Fecundity, fertility and numerical productivity rate decreased during dry years. Mortality rate was 16% in dry years versus 6% in humid years.

Key words: Drought, livestock systems, productivity, Morocco.

Materials and methods

This study was carried out in the Northern Central Region of Morocco (Sais) which is characterized by rainfed agriculture and the importance of cereals and livestock. Data were collected from the Ministry of Agriculture Services from 1995 to 2003. The data collected concerned precipitation, cereals and forage yields, livestock herd size and feed prices, and the quantity of slaughtered meat. The studied years (1995-2003) were classified according to drought: (i) Humid (H): 95/96 and 02/03; (ii) Moderately Humid (MH):96/97 and 97/98; (iii) Moderately Dry (MD): 2000/01; and (iv) Severely Dry (SD): 98/99, 99/00 and 01/02. In order to investigate drought impact on livestock systems and their productivity, 130 breeders were selected in the studied area according to land, livestock ownership, and breeder’s cooperation. Data concerning agricultural area, flock size, feeding calendar, sanitary
measures, animal sales, livestock and crops production, were collected by a questionnaire from April to June 2004. The study years 2000-2004 were classified according to drought: (i) Moderately dry: 2000/01; (ii) Severely dry: 2001/02; and (iii) Humid: 2002/03 and 2003/04.

Results and discussion

Impact of drought at the regional level (SAIS)

Data were analyzed according to three Drought Indicators related to Livestock Productivity:

(i) Pertinent indicators represented by forage production; livestock prices; feed prices.

(ii) Moderately pertinent indicators represented by price of fattened animals; livestock herd size.

(iii) Poorly pertinent indicators represented by the number of slaughtered animals.

Pertinent indicators

The results show that all pertinent indicators varied according to drought severity. Forage production (Fig. 1) as well as ewes and cows prices (Figs. 6, 7) decreased considerably during dry years, whereas the prices of barley (Fig. 2) straw (Fig. 3) bran (Fig. 4) and dry beet pulp (Fig. 5) increased during dry years.

Fig. 1. Forage production as affected by drought.

Fig. 2. Barley prices evolution (Dh/kg) during a humid year and a dry year.

Fig. 3. Straw prices evolution during a humid year and a dry year.
Moderatedly pertinent indicators

Concerning moderately pertinent indicators, fattened lamb and calves evolutions (Figs 8 and 9) shows the same trend during humid and dry years. This can be explained by the fact that all the feed used is purchased and not produced by breeders. However the prices were higher during a humid year because feed is more available and fewer animals are fattened. Herd size evolution (Fig. 10)
was also slightly affected by drought. Bouslikhane et al. (2001) also showed that moderately pertinent indicators are slightly affected by drought.

Poorly pertinent indicators represented by the number of slaughtered animals were not analyzed because of lack of data.

Fig. 8. Fattened lamb prices evolution during a humid and a dry year.

Fig. 9. Comparison of fattened calves prices during a humid and a dry year.

Fig. 10. Herd size evolution from 1995 to 2002.

**Impact of drought on cereals yields**

Although cereals yields are very affected by drought (Fig. 11), they were not considered as indicators because cereals yields estimation is not available until the effects of drought are already visible. The low yield observed in droughty years is the result of water stress during the growing cycle of crops.
Impact of drought on livestock systems and productivity: Breeders investigations

Cereals straw, oat-vetch and bitter vetch yields were very affected by drought (Table 1). The highest yields were obtained during humid years whereas the lowest were obtained in dry years.

Table 2 shows that the lowest quantity of feed was produced in dry years. Inversely the amount of purchased feed increased in severely dry years.

Sheep, goats, and cattle feed supplement varied according to drought severity: 3 months in a humid year (Fig. 12), 8 months in a moderately dry year (Fig. 13) and 12 months in a severely dry year (Fig. 14). Keli (2002) and Abrigache (2003) obtained the same results. The increase in feed supplement duration can be explained by the lower contribution of pasture, fallow and stubbles during drought. The previous figures show that drought modified livestock systems from extensive based on pasture fallow and stubble to intensive based on feed supplement.
The impact of drought on the reproduction and productivity parameters was statistically significant for sheep and goat (Tables 3 and 4). Fertility, fecundity and prolificity rates as well as numerical productivity decreased in severely dry years (Tables 3 and 4). The decrease of the previous parameters can be explained by malnutrition during the breeding season and gestation (Kabbali and Berger, 1990; Keli, 2002). Mortality and abortion rates increased with drought.

The impact of drought on cattle productivity was not assessed because most cattle herds are conducted in irrigated area.

Table 3. Impact of drought on sheep productivity

<table>
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<tr>
<th>Parameters</th>
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<th>Humid 03-04</th>
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<td>1083.00</td>
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<td>93.99</td>
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<td>107.02</td>
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<td>85.80</td>
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<td>Mortality rate (young)</td>
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<tr>
<td>Mortality rate (adults)</td>
<td>4.59</td>
<td>6.12</td>
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Conclusion

This study showed that drought induced a decrease of cereals and forage yields, sheep and goat flock size and reproduction performances as well as an increase of purchased feed, feed supplement duration, animal’s sales, mortalities and reforms.

Based on these results, the suggested measures to reduce drought losses are:

(i) Identify reliable and early indicators of drought.

(ii) Improve the way to collect data related to drought indicators.

(iii) Feed supplement should be based on animals nutritional needs and not only drought severity.

(iv) Adapt flocks size to feed availability with a good management of forages supplies.

(v) Pastures improvement to reduce supplemental feeding charges.

References


Table 4. Impact of drought on goat productivity

<table>
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<tr>
<th>Parameters</th>
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<th>Humid 03-04</th>
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<td>3.93</td>
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<td>4.01</td>
<td>3.67</td>
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<tr>
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<td>14.10</td>
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<td>4.70</td>
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<tr>
<td>Mortality rate (adults)</td>
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