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The influence of breed and maternal "education" on goat kids' intake of a tannin-rich shrub

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Introduction Many plant species have developed a wide array of defense mechanisms. A very pronounced one is the production of tannins that sharply decrease palatability, feed intake, various enzyme activities, nutrient availability, and animal performance (Makkar 2003). On a yearly basis, free-ranging adult Damascus goats consume more than twice as much tannin-rich *P. lentiscus* (22%) than do Mamber goats (Glasser *et al.* 2006). Are Damascus kids born with this ability, or is this learned from the kids' mother? The aim of this study was to quantify the behavioral effects of the "educating" mothers' breed vs. breed of kid in domestic goats of two breeds, as related to intake of tannin-rich browse.

Materials and methods Goats used for this research were of Damascus and Mamber breeds, which are commonly raised in the Eastern Mediterranean region. Experiments took place at the "Ramat-Hanadiv Nature Park", located at the south of Israel's Carmel mountain ridge, an area dominated by dense Mediterranean shrubland. Treatments consisted of three groups: kids reared by their biological mothers, cross-fostered kids of the reciprocal breed, and kids fed by a milk-powder dispensing machine ("artificial mother") from birth. Treatments were applied to three groups of three kids of each breed, except for Damascus kids fostered by Mamber does, which consisted of two groups (total of 17 groups). Experiments were conducted at two different developmental stages of kids' growth: "Naive"-before weaning, when kids had only started to eat dry food without grazing, and "Experienced"-after kids from each group had grazed separately with biological, fostering, or no mothers. Two experiments were conducted. During Experiment 1, kids were exposed for five minutes daily to *P. lentiscus* or *P. latifolia* containing 22 and 3% PEG-binding tannins, respectively, for 2 periods of 6 days each. In Experiment 2, kids were exposed to both browse species simultaneously for 2 periods of 3 days each.

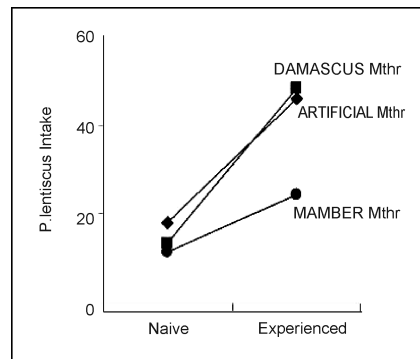


Figure 1 Intake of *P. lentiscus* in kids' diets during Experiment 2.

Results In both experiments, experienced kids consumed more browse than did naive kids, when calculated per metabolic BW ($F_{1,50} = 90.3, P < 0.0001$). Kids did not exhibit higher propensity to ingest *P. lentiscus* or *P. latifolia* when given alone during Experiment 1. During Experiment 2, naive kids consumed the same proportions of *P. lentiscus* and *P. latifolia* as well. However, diets consumed by experienced kids raised by Damascus does, milk-dispenser or Mamber does consisted of 45.8, 48.1 and 24.3 g/kg^{0.75} of *P. lentiscus*, respectively ($F_{2,20} = 5.0, P = 0.01$, Figure 1).

Conclusions These results suggest a strong maternal "educative" effect on kids' dietary selection for tannin-rich browse, as opposed to the kids' breed, which did not exhibit any effect on intake of *P. lentiscus* at the naive stage. The findings regarding the Mamber-mother group lead to the conclusion that dietary selection regarding tannins is passed from mother to kid by avoidance (or the absence of it in the "artificial mother" group) rather than learning to prefer a specific plant species.

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