

THE EFFECTS OF THE NAKED NECK (*Na*) AND FEATHERLESS (*sc*) GENES ON PERFORMANCE LOSSES OF BROILERS REARED UNDER HOT TEMPERATURE

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Production of broilers under hot conditions is hindered by the inadequacy of contemporary fast-growing stocks that have been bred for high rate of feed intake and metabolism under temperate conditions. In hot conditions, fast-growing broilers exhibit decreased liveability and do not reach their full genetic potential for growth rate and meat yield. This happens because under high ambient temperatures, dissipation of excessive internal heat – outcome of high metabolic rate – is hindered by the feather coverage. Therefore it was hypothesized that heat stress can be alleviated by the use of the co-dominant gene *Na* of the naked neck phenotypes, and the recessive gene *sc* (scaleless) responsible for the featherless phenotype.

A controlled trial was conducted at Rehovot (Israel) with four experimental genetic groups (normally feathered, heterozygous naked-neck, homozygous naked-neck, featherless), progeny of the same double-heterozygous parents (*Na/na +/sc*), and a commercial line. The 261 birds from all five groups were brooded together; on Day 21 each group was separated to two equal-size sub-groups. Birds from one sub-group were pooled and reared together under normal ambient temperature (constant 25°C), and the other sub-groups were pooled and reared together under high ambient temperature (constant 35°C). Live weight and body temperature were recorded repeatedly from hatch to slaughter - when carcass yields were recorded - at 46 and 52 days of age for birds at normal and hot conditions, respectively.

Only the featherless birds exhibited similar growth under the two temperatures, while the commercial broilers exhibited the highest and earliest depression in weight gains under hot vs. normal temperature. Mean breast yield of the naked neck genotypes (*na/na*, *Na/na*, *Na/Na*) increased as their feather coverage decreased from 100% to 80% and 60%, respectively, but this trend was lower under hot conditions. Mean breast meat yield of the featherless birds was much higher than their sibs, and also higher than the commercial broilers under hot conditions and similar to them under normal conditions. The elevation in body temperature due to rearing under hot vs. normal conditions was highest (+2.0°C) in the commercial broilers. Significantly less elevation (1.4°C) was exhibited by the fully-feathered (*na/na*) experimental birds (relatively slow-growing), and it was lower (1.3°C and 1.2°C) in the heterozygous and homozygous naked neck birds. Only in the featherless broilers, body temperature was the same under normal and hot conditions, as was their growth rate and breast meat yield.

The experimental birds have not been selected yet to the level of contemporary commercial broilers, but the results suggest that introduction of the *sc* gene into fast-growing commercial broiler lines is a promising approach to improve production of broiler meat in hot conditions.

Key words: naked-neck, *Na*, featherless, *sc*, broiler, growth, breast meat yield, hot conditions.