

English Title: **Response surface and fixed effects models** of non-genetic **factors for dairy cows** in **Saudi** Arabia.  
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Abstract:

**Response surface** model of statistical analysis was used to quantify the relationship between non-genetic **factors** (NGF) such as days open (DO), days in milk (DIM), age at calving **and** milk production. Data included 103 776 records, each one had cow identification, non genetic traits **and** production traits such as total milk production, 305-milk yield **and** peak yield. Least square means of three farms were 10 467, 11 047 **and** 10 697 litres of milk, respectively. **Cows** calved on fall-winter season produced 10 839 litres, compared with 10 636 litres **for cows** calved in spring-summer season. Second lactation **cows** gave the highest production (11 105 litres), **and** sixth lactation **cows** produced the lowest production (10 283 litres). Significant parameters ( $P<0.01$ ) supported the linear **and** quadratic relationship between age at calving **and** total yield, 305-d yield **and** peak milk production, respectively. The DIM had a significant linear effect on milk production ( $P<0.01$ ). Also, quadratic representation of DIM was observed along the whole milk curve. Days open showed no linear significant effect on milk production. However, significant quadratic effect ( $P<0.05$ ) was observed between DO **and** 305-d yield. The ANOVA of **fixed** model showed a significant effect of NGF on production traits.

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