**Application:** The addition of supplemental amino acids (AA), methionine (Met), and lysine (Lys) increases the post-pubertal growth, first lactation milk yield, and survival Holstein Friesian dairy heifers offered an isoenergetic and iso-effective rumen degradable protein (ERDP) diet.

**Introduction:** The loss and calving age of dairy heifers are far greater in the UK compared with Europe and the USA (Boulton et al., 2015). Supplementation of AA acids to dairy heifers has received little research attention. This study aimed to assess the effect of AA supplementation on post-pubertal growth and first-lactation milk yield, fertility, feed efficiency, and survival rates of dairy heifers.

**Materials and Methods:** A total of 76 pubertal heifers, born at the University of Nottingham Centre of Dairy Science (CDSI), were selected at random and allocated at 12 to 12.5 mo. of age according to birth date and live weight (LW) to be supplemented (+AA) and not supplemented with AA (-AA) Met and Lys for three months. Heifers were offered a perennial grass and maize silage (50:50 DM) based diet, with 2.5 kg/hd/d of supplement that resulted in an isoenergetic and iso-effective rumen degradable protein diet of enhanced and typical AA concentration. The LW, age at first calving, fertility, milk yield (MY), feed efficiency (FE), and survival were measured from 12 mo. of age to the end of first lactation.

**Statistical analysis:** Data was collated in Excel. The somatic cell count (SSC) was Logbase10 transformed, and data was assessed for normality of distribution using Minitab 17.0. The normally distributed data was assessed using ANOVA GLM, while the pregnancy rate was assessed by Chi-square analysis, with -AA and +AA as a fixed effect in the model. Data was reported as means (± SE) with P values and significant differences between means were reported at a P<0.05.

**Results:** Mean LW gain between 12 and 15 mo. and first lactation milk, ECM, FPCM, fat, protein, and solids yield and survival rates were greater for heifers offered +AA, compared with -AA (Table 1). The mean LW gain between 16 and 24 mo., mature LW and age at first calving, pregnancy rate (PR), calving interval (CI), and feed efficiency (FE) did not between heifers offered +AA and -AA.

# **Table 1: Mean growth, lactation performance, and survival rates (± se), of dairy heifers offered post-pubertal diets with (+AA) and without (-AA) supplemented amino acids between 12 and 15 mo. of age**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **+AA** | **-AA** | **P Value** |
| Obs., No. | 36 | 36 | - |
| Weight gain 12 to 15 mo., kg/d |  1.20 (0.284) | 1.00 (0.272) | 0.012 |
| Proportion of maturity at parturition, % 1 | 86 (1.4) | 84 (1.4) | 0.206 |
| Age at first calving, mo. | 23.7 (0.25) | 23.4 (0.26) | 0.418 |
| Milk yield, kg/d | 35.7 (0.95) | 32.8 (0.95) | 0.038 |
| ECM yield, kg/d 2 | 40.2 (0.37) | 38.7 (0.39) | 0.003 |
| FPCM yield, kg/d 3 | 36.7 (0.79) | 34.0 (0.79) | 0.016 |
| Milk fat, g/kg | 41.3 (0.11) | 41.6 (0.11) | 0.030 |
| Milk protein, g/kg  | 35.8 (0.06) | 36.0 (0.06) | 0.764 |
| Logbase10 SCC, 000 cells/ml | 1.6 (0.58) | 1.5 (0.48) | 0.539 |
| Milk fat, kg/d  | 1.46 (0.034) | 1.35 (0.034) | 0.030 |
| Milk protein, kg/d | 1.27 (0.031) | 1.18 (0.031) | 0.042 |
| Milk solids, kg/d | 2.72 (0.058) | 2.52 (0.058) | 0.015 |
| Pregnancy rate, % | 87 (6.3) | 83 (6.9) | 0.345 |
| Calving interval, d  | 365 (8.5) | 354 (8.5) | 0.391 |
| Feed efficiency, kg DMI/ kg FPCM yield | 0.69 (0.019) | 0.70 (0.019) | 0.553 |
| Survival, 12 mo. to end of first lactation, % | 81 | 73 | 0.049 |

1 – Proportion of maturity at parturition was calculated from the live weight / mature weight of ≥ third lactation cows in the closed herd into which the heifers were born. 2 –– ECM – Energy corrected yield, kg = 0.327 x milk yield kg + 12.95 x milk fat kg + 7.21 x milk protein kg (Sjaunja et al. 1990) 3 – FPCM *=* Milk kg × ((0.1226 × Fat %) + (0.0776 × Protein %) + 0.2534) (Gerber et al. 2010)

**Conclusions:** The LW gain from 16 to 24 mo., mature LW and age at first calving, and first lactation PR, CI, and FE did not differ between heifers offered +AA and -AA. However, the addition of AA (Met and Lys) increased LW gain between 12 and 15 mo. and increased first lactation milk, ECM, FPCM, fat, protein, and solids yields, and survival rates. AA supplementation of dairy heifers warrants further study.

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**References**

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