**Table (1): Chemical composition of feedstuffs and experimental rations.**

|  |  |  |
| --- | --- | --- |
| Composition of DM % | DM % | Item |
| Ash | NFE | EE | CF | CP | OM |
|  |  |  |  |  |  |  | Feedstuffs: |
| 7.49 | 62.11 | 2.37 | 11.32 | 16.71 | 92.51 | 89.88 | Concentrate feed mixture |
| 9.90 | 46.12 | 3.10 | 28.49 | 12.39 | 90.10 | 91.21 | Berseem hay |
| 5.05 | 62.72 | 2.47 | 19.91 | 9.85 | 94.95 | 30.12 | Corn silage |
| 16.49 | 44.50 | 1.92 | 33.47 | 3.62 | 83.51 | 89.79 | Rice straw |
| 11.48 | 37.91 | 2.48 | 33.63 | 14.50 | 88.52 | 90.22 | *Moringa oliefera* stems |

|  |
| --- |
| Experimental ration: |
| R1 (Control) | 64.45 | 90.72 | 11.86 | 20.90 | 2.45 | 55.51 | 9.28 |
| R2 (10% MS) | 64.40 | 90.56 | 12.07 | 21.42 | 2.38 | 54.69 | 9.44 |
| R3 (20% MS) | 64.38 | 90.40 | 12.28 | 21.93 | 2.32 | 53.87 | 9.60 |

**Table (2): Nutrients digestibility coefficients and feeding values for different rations.**

|  |  |  |
| --- | --- | --- |
| Item | Experimental rations | SEM |
| R1 | R2 | R3 |
| Digestibility % |
| DM | 66.65b | 70.13a | 69.73a | 0.61 |
| OM | 68.9b | 72.46a | 72.03ab | 0.71 |
| CP | 77.16b | 81.24a | 80.18ab | 0.71 |
| EE | 67.48ab | 66.00b | 68.42a | 0.54 |
| CF | 67.47 | 66.76 | 67.22 | 1.33 |
| NFE | 67.34 | 69.02 | 67.99 | 0.79 |
| Feeding values % |
| TDN | 64.35 | 65.38 | 64.79 | 0.79 |
| DCP | 9.15b | 9.81a | 9.85a | 0.15 |

*a, b: Values in the same row with different superscripts differ significantly (P<0.05).*

*Control ration (R1) consisted of 40% concentrate feed mixture (CFM) + 20% corn silage (CS) + 20% rice straw (RS) + 20% barseem hay (BH) based on dry matter, While the tested rations contained 10 and 20% Moringa oliefera stems (MS) instead of 50 and 100% of BH in R2 and R3, respectively.*

**Table (3): Daily feed intake (kg/head/day) for experimental cows.**

|  |  |  |
| --- | --- | --- |
| Item | Experimental rations | SEM |
| R1 | R2 | R3 |
| Concentrate feed mixture\* | 7.08 | 7.17 | 7.07 |  |
| Berseem hay | 3.49 | 1.77 | - |  |
| Corn silage\* | 10.56 | 10.69 | 10.55 |  |
| Rice straw\* | 3.54 | 3.59 | 3.54 |  |
| *Moringa oliefera* stems\* | - | 1.78 | 3.52 |  |
| Total DM  | 15.90 | 16.10 | 15.89 | 0.27 |
| TDN | 10.23 | 10.53 | 10.30 | 0.15 |
| CP | 1.89 | 1.94 | 1.95 | 0.07 |
| DCP | 1.45 | 1.58 | 1.57 | 0.04 |

*\* as fed.*

*Control ration (R1) consisted of 40% concentrate feed mixture (CFM) + 20% corn silage (CS) + 20% rice straw (RS) + 20% barseem hay (BH) based on dry matter, While the tested rations contained 10 and 20% Moringa oliefera stems (MS) instead of 50 and 100% of BH in R2 and R3, respectively.*

**Table (4): Rumen fermentation activity for experimental dietary treatments.**

|  |  |  |
| --- | --- | --- |
| Item` | Experimental ration | SEM |
| R1 | R2 | R3 |
| pH value | 6.36 | 6.24 | 6.26 | 0.17 |
| TVFA’s (meq/100 ml) | 6.33 | 6.38 | 6.82 | 0.28 |
| NH3-N (mg/100 ml) | 24.86 | 25.01 | 24.25 | 1.45 |

*Control ration (R1) consisted of 40% concentrate feed mixture (CFM) + 20% corn silage (CS) + 20% rice straw (RS) + 20% barseem hay (BH) based on dry matter, While the tested rations contained 10 and 20% Moringa oliefera stems (MS) instead of 50 and 100% of BH in R2 and R3, respectively.*

**Table (5): Blood plasma metabolites for experimental rations fed to cows.**

|  |  |  |
| --- | --- | --- |
| Item | Experimental rations | SEM |
| R1 | R2 | R3 |
| Total protein (g/dl) | 7.10b | 7.62ab | 7.96a | 0.28 |
| Albumin (g/dl) | 3.68b | 4.06ab | 4.32a | 0.17 |
| Globulin (g/dl) | 3.42b | 3.56ab | 3.64a | 0.24 |
| Urea-N (g/d) | 28.44a | 25.3ab | 22.92b | 0.83 |
| Creatinine (g/d) | 1.36a | 1.10ab | 1.01b | 0.066 |
| AST (U/L) | 44.42 | 43.38 | 42.24 | 0.53 |
| ALT (U/L) | 14.58 | 13.54 | 13.08 | 0.31 |

*a, b: Values in the same row with different superscripts differ significantly (P<0.05).*

*Control ration (R1) consisted of 40% concentrate feed mixture (CFM) + 20% corn silage (CS) + 20% rice straw (RS) + 20% barseem hay (BH) based on dry matter, While the tested rations contained 10 and 20% Moringa oliefera stems (MS) instead of 50 and 100% of BH in R2 and R3, respectively.*

**Table (6): Average milk yield and composition for experimental rations during lactation period.**

|  |  |  |
| --- | --- | --- |
| Item | Experimental rations | SEM |
| R1 | R2 | R3 |  |
| Average milk yield (kg/day): |
| Actual milk | 14.64b | 15.94ab | 16.30a | 0.34 |
| Increase% | 0.00c | 8.88b | 11.34a | 1.72 |
| 4% F C M | 13.34b | 14.77ab | 15.54a | 0.38 |
| Increase% | 00.00c | 10.72b | 16.49a | 2.42 |
| Milk composition %: |
| Fat | 3.41b | 3.51ab | 3.69a | 0.07 |
| Protein | 2.70b | 2.82ab | 2.88a | 0.05 |
| Lactose | 4.65 | 4.70 | 4.81 | 0.07 |
| TS | 11.45b | 11.73ab | 12.09a | 0.19 |
| SNF | 8.04b | 8.22ab | 8.40a | 0.13 |
| Ash | 0.69 | 0.70 | 0.71 | 0.01 |

*a, b, c: Values in the same row with different superscripts differ significantly (P<0.05).*

*Control ration (R1) consisted of 40% concentrate feed mixture (CFM) + 20% corn silage (CS) + 20% rice straw (RS) + 20% barseem hay (BH) based on dry matter, While the tested rations contained 10 and 20% Moringa oliefera stems (MS) instead of 50 and 100% of BH in R2 and R3, respectively.*

**Table (7): Feed conversion and economic efficiency for experimental rations.**

|  |  |  |
| --- | --- | --- |
| Item | Experimental rations | SEM |
| R1 | R2 | R3 |
| Feed conversion: |  |  |  |  |
| DM, kg/kg FCM | 1.19a | 1.09ab | 1.02b | 0.04 |
| TDN, kg/kg FCM | 0.77a | 0.71ab | 0.66b | 0.02 |
| CP, kg/kg FCM | 0.14 | 0.13 | 0.13 | 0.008 |
| DCP, kg/kg FCM | 0.11 | 0.11 | 0.10 | 0.006 |
| Economic efficiency: |  |  |  |  |
| Feed cost, LE/day | 47.55a | 46.58ab | 44.39b | 1.43 |
| Feed cost (LE)/ kg 4% FCM | 3.56a | 3.15ab | 2.86b | 0.16 |
| Price of 4% FCM yield, LE/day | 60.48b | 66.47a | 69.93a | 1.75 |
| Economic efficiency | 1.27b | 1.43ab | 1.58a | 0.12 |

*Control ration (R1) consisted of 40% concentrate feed mixture (CFM) + 20% corn silage (CS) + 20% rice straw (RS) + 20% barseem hay (BH) based on dry matter, While the tested rations contained 10 and 20% Moringa oliefera stems (MS) instead of 50 and 100% of BH in R2 and R3, respectively.*

*a, b: Values in the same row with different superscripts differ significantly (P<0.05).*

*Prices of one kg were 4.70 LE for CFM, 2.10 LE for BH, 0.50 LE for CS, 0.32 LE for RS, 1.20 LE for MS and 4.50 LE for 4% FCM according to prices 2017.*