

# CONTENTS

| Title                            | Page |
|----------------------------------|------|
| <b>1. INTRODUCTION</b>           | 1    |
| <b>2. REVIEW OF LITERATURE</b>   | 3    |
| 2.1. Tomato By-Product Meal.     | 3    |
| 2.1.1. Chemical composition.     | 5    |
| 2.1.2. Amino acid contents.      | 9    |
| 2.1.3. Growth performance.       | 13   |
| 2.2. Potato By-Product Meal.     | 15   |
| 2.2.1. Chemical composition.     | 17   |
| 2.2.2. Amino acid contents.      | 20   |
| 2.2.3. Growth performance.       | 23   |
| 2.3. Pea Hulls Meal.             | 26   |
| 2.3.1. Chemical composition.     | 26   |
| 2.3.2. Amino acid contents.      | 29   |
| 2.3.3. Growth performance.       | 33   |
| 2.4. Date Stone Meal.            | 36   |
| 2.4.1. Chemical composition.     | 37   |
| 2.4.2. Amino acid contents.      | 38   |
| 2.4.3. Growth performance.       | 43   |
| <b>3. MATERIALS AND METHODS.</b> | 55   |
| 3.1. Tested By-Product Meals.    | 55   |
| 3.2. Experimental Chicks.        | 55   |
| 3.3. Experimental Diets.         | 56   |

| <b>Title</b>   | <b>Page</b> |
|--|-------------|
| 3.4. Management.   | 62          |
| 3.5. Methods of Interpreting Results.  | 62          |
| 3.5.1. Live body weight.   | 63          |
| 3.5.2. Weight gain.  | 63          |
| 3.5.3. Feed intake.  | 63          |
| 3.5.4. Feed conversion.  | 64          |
| 3.6. Digestibility Trials.   | 64          |
| 3.7. Slaughter Test.   | 66          |
| 3.8. Chemical Analysis.  | 67          |
| 3.9. Amino Acids Determination.  | 67          |
| 3.9.1. Chemical score.   | 68          |
| 3.10. Economic Efficiency.   | 68          |
| 3.11. Statistical Analysis.  | 69          |
| <b>4. RESULTS AND DISCUSSION.</b>  | <b>70</b>   |
| 4.1. Chemical Analysis of Tested By-Product Meals.   | 70          |
| 4.2. Amino Acid Contents of Tested By-Product Meals.   | 73          |
| 4.3. Feeding Experiments.  | 77          |
| 4.3.1. First feeding experiment (tomato by-product meal).  | 77          |
| 4.3.1.1. Effect of feeding different dietary levels of tomato by-product meal on growth performance of broiler chicks. | 77          |
| 4.3.1.1.1. Live body weight.   | 77          |

| <b>Title</b>   | <b>Page</b> |
|--|-------------|
| 4.3.1.1.2. Weight gain.  | 79          |
| 4.3.1.1.3. Feed intake.  | 81          |
| 4.3.1.1.4. Feed conversion.  | 84          |
| 4.3.1.2. Effect of feeding different dietary levels of tomato by- product meal on nutrients digestibility of broiler chicks.                 | 87          |
| 4.3.1.3. Effect of feeding different dietary levels of tomato by-product meal on carcass characteristics and carcass cuts of broiler chicks. | 91          |
| 4.3.1.4. Effect of feeding different dietary levels of tomato by-product meal on chemical composition of broiler chicks meat.                | 97          |
| 4.3.1.5. Effect of feeding different dietary levels of tomato by-product meal on the economic efficiency of experimental diets               | 99          |
| 4.3.2. Second feeding experiment (potato by-product meal).   | 101         |
| 4.3.2.1. Effect of feeding different dietary levels of potato by- product meal on growth performance of broiler chicks.                      | 101         |
| 4.3.2.1.1. Live body weight.   | 101         |
| 4.3.2.1.2. Weight gain.  | 104         |
| <b>Title</b>   | <b>Page</b> |

|  |     |
|--|-----|
| 4.3.2.1.3. Feed intake.  | 106 |
| 4.3.2.1.4. Feed conversion.  | 108 |
| 4.3.2.2. Effect of feeding different dietary levels of potato by-product meal on nutrients digestibility of broiler chicks                   | 112 |
| 4.3.2.3. Effect of feeding different dietary levels of potato by-product meal on carcass characteristics and carcass cuts of broiler chicks. | 116 |
| 4.3.2.4. Effect of feeding different dietary levels of potato by-product meal on chemical composition of broiler chicks meat.                | 122 |
| 4.3.2.5. Effect of feeding different dietary levels of potato by-product meal on the economic efficiency of experimental diets.              | 124 |
| 4.3.3. Third feeding experiment (pea hulls meal).  | 127 |
| 4.3.3.1. Effect of feeding different dietary levels of pea hulls meal on growth performance of broiler chicks                                | 127 |
| 4.3.3.1.1. Live body weight.   | 127 |
| 4.3.3.1.2. Weight gain   | 129 |

|              |             |
|--------------|-------------|
| <b>Title</b> | <b>Page</b> |
|--------------|-------------|

|  |     |
|--|-----|
| 4.3.3.1.3. Feed intake.  | 132 |
| 4.3.3.1.4. Feed conversion.  | 132 |
| 4.3.3.2. Effect of feeding different dietary levels of pea hulls meal on nutrients digestibility of broiler chicks.                  | 138 |
| 4.3.3.3. Effect of feeding different dietary levels of pea hulls meal on carcass characteristics and carcass cuts of broiler chicks. | 141 |
| 4.3.3.4. Effect of feeding different dietary levels of pea hulls meal on chemical composition of broiler chicks meat.                | 147 |
| 4.3.3.5. Effect of feeding different dietary levels of pea hulls meal on the economic efficiency of experimental diets.              | 149 |
| 4.3.4. Fourth feeding experiment (date stone meal).  | 151 |
| 4.3.4.1. Effect of feeding different dietary levels of date stone meal on growth performance of broiler chicks.                      | 151 |
| 4.3.4.1.1. Live body weight.   | 151 |
| 4.3.4.1.2. Weight gain.  | 153 |
| 4.3.4.1.3. Feed intake.  | 155 |
| 4.3.4.1.4. Feed conversion.  | 158 |

| <b>Title</b>  | <b>Page</b> |
|---|-------------|
| 4.3.4.2. Effect of feeding different dietary levels of date stone meal on nutrients digestibility of broiler chicks.                  | 162         |
| 4.3.4.3. Effect of feeding different dietary levels of date stone meal on carcass characteristics and carcass cuts of broiler chicks. | 165         |
| 4.3.4.4. Effect of feeding different dietary levels of date stone meal on chemical composition of broiler chicks meat.                | 172         |
| 4.3.4.5. Effect of feeding different dietary levels of date stone meal on the economic efficiency of experimental diets.              | 174         |
| <b>5. SUMMARY AND CONCLUSION.</b>   | 177         |
| <b>6. REFERENCES</b>  | 189         |
| <b>7. ARABIC SUMMARY.</b>   | --          |

## LIST OF TABLES

| <b>No of Table</b> | <b>Title of Table</b>   | <b>Page</b> |
|--------------------|---|-------------|
| <b>1</b>           | Composition and chemical analysis of starter, grower and finisher control diets.  | 57          |
| <b>2</b>           | Composition and chemical analysis of starter, grower and finisher diets containing tomato by-product meal.                        | 58          |
| <b>3</b>           | Composition and chemical analysis of starter, grower and finisher diets containing potato by-product meal.                        | 59          |
| <b>4</b>           | Composition and chemical analysis of starter, grower and finisher diets containing pea hulls meal.                                | 60          |
| <b>5</b>           | Composition and chemical analysis of starter, grower and finisher diets containing date stone meal.                               | 61          |
| <b>6</b>           | Chemical analysis of tested by-product meals (% on DM basis).   | 71          |
| <b>7</b>           | Cell wall constituents of tested by-products meals (% on DM basis).   | 73          |
| <b>8</b>           | Amino acid contents (%) of tested by-product meals.   | 75          |
| <b>9</b>           | Amino acid contents (g/100g protein) of tested by-product meals.  | 76          |
| <b>10</b>          | Live body weight (g $\pm$ SE) of broiler chicks fed different dietary levels of TBM at different ages of the experimental period. | 78          |

| <b>No of Table</b> | <b>Title of Table</b>  | <b>Page</b> |
|--------------------|--|-------------|
| <b>11</b>          | Analysis of variance of live body weight (g) of broiler chicks fed different dietary levels of TBM at different ages of the experimental period.                       | 78          |
| <b>12</b>          | Weight gain ( $g \pm SE$ ) of broiler chicks fed different dietary levels of TBM at different experimental periods.  | 80          |
| <b>13</b>          | Analysis of variance of weight gain (g) of broiler chicks fed different dietary levels of TBM at different experimental periods.                                       | 80          |
| <b>14</b>          | Feed intake ( $g \pm SE$ ) of broiler chicks fed different dietary levels of TBM at different experimental periods.  | 82          |
| <b>15</b>          | Analysis of variance of feed intake (g) of broiler chicks fed different dietary levels of TBM at different experimental periods.                                       | 82          |
| <b>16</b>          | Feed conversion ( $g \text{ feed} / g \text{ gain} \pm SE$ ) of broiler chicks fed different dietary levels of TBM at different experimental periods.                  | 85          |
| <b>17</b>          | Analysis of variance of feed conversion ( $g \text{ feed} / g \text{ gain}$ ) of broiler chicks fed different dietary levels of TBM at different experimental periods. | 85          |
| <b>18</b>          | Effect of feeding different dietary levels of TBM on nutrients digestibility (%) of broiler chicks at 8 weeks of age.  | 88          |
| <b>19</b>          | Analysis of variance for the effect of feeding different dietary levels of TBM on nutrients digestibility (%) of broiler chicks at 8 weeks of age.                     | 89          |

  

| <b>No of</b> | <b>Title of Table</b> | <b>Page</b> |
|--------------|-----------------------|-------------|
|--------------|-----------------------|-------------|



| <b>Table</b> |  |     |
|--------------|--|-----|
| <b>20</b>    | Effect of feeding different dietary levels of TBM on carcass characteristics (%) of broiler chicks at 8 weeks of age.                              | 92  |
| <b>21</b>    | Analysis of variance for the effect of feeding different dietary levels of TBM on carcass characteristics (%) of broiler chicks at 8 weeks of age. | 93  |
| <b>22</b>    | Effect of feeding different dietary levels of TBM on carcass cuts (%) of broiler chicks at 8 weeks of age.   | 95  |
| <b>23</b>    | Analysis of variance for the effect of feeding different dietary levels of TBM on carcass cuts (%) of broiler chicks at 8 weeks of age.            | 96  |
| <b>24</b>    | Effect of feeding different dietary levels of TBM on chemical composition (%) of broiler chicks meat.  | 98  |
| <b>25</b>    | Analysis of variance for the effect of feeding different dietary levels of TBM on chemical composition (%) of broiler chicks meat.                 | 98  |
| <b>26</b>    | Effect of feeding different dietary levels of TBM on the economic efficiency of experimental diets.  | 100 |
| <b>27</b>    | Live body weight (g $\pm$ SE) of broiler chicks fed different dietary levels of PBM at different ages of the experimental period.                  | 102 |
| <b>28</b>    | Analysis of variance of live body weight (g) of broiler chicks fed different dietary levels of PBM at different ages of the experimental period.   | 102 |

| <b>No of Table</b> | <b>Title of Table</b> | <b>Page</b> |
|--------------------|-----------------------|-------------|
|--------------------|-----------------------|-------------|

|           |   |     |
|-----------|---|-----|
| <b>29</b> | Weight gain ( $g \pm SE$ ) of broiler chicks fed different dietary levels of PBM at different experimental periods.   | 105 |
| <b>30</b> | Analysis of variance of weight gain (g) of broiler chicks fed different dietary levels of PBM at different experimental periods.                                      | 105 |
| <b>31</b> | Feed intake ( $g \pm SE$ ) of broiler chicks fed different dietary levels of PBM at different experimental periods.   | 107 |
| <b>32</b> | Analysis of variance of feed intake (g) of broiler chicks fed different dietary levels of PBM at different experimental periods.                                      | 107 |
| <b>33</b> | Feed conversion ( $g \text{ feed} / g \text{ gain} \pm SE$ ) of broiler chicks fed different dietary levels of PBM at different experimental periods                  | 109 |
| <b>34</b> | Analysis of variance of feed conversion ( $g \text{ feed} / g \text{ gain}$ ) of broiler chicks fed different dietary levels of PBM at different experimental periods | 109 |
| <b>35</b> | Effect of feeding different dietary levels of PBM on nutrients digestibility (%) of broiler chicks at 8 weeks of age  | 113 |
| <b>36</b> | Analysis of variance for the effect of feeding different dietary levels of PBM on nutrients digestibility (%) of broiler chicks at 8 weeks of age.                    | 114 |

| <b>No of Table</b> | <b>Title of Table</b>                                | <b>Page</b> |
|--------------------|--|-------------|
| <b>37</b>          | Effect of feeding different dietary levels of PBM on | 117         |

|           |  |     |
|-----------|--|-----|
|           | carcass characteristics (%) of broiler chicks at 8 weeks of age.   |     |
| <b>38</b> | Analysis of variance for the effect of feeding different dietary levels of PBM on carcass characteristics (%) of broiler chicks at 8 weeks of age. | 118 |
| <b>39</b> | Effect of feeding different dietary levels of PBM on carcass cuts (%) of broiler chicks at 8 weeks of age.   | 120 |
| <b>40</b> | Analysis of variance for the effect of feeding different dietary levels of PBM on carcass cuts (%) of broiler chicks at 8 weeks of age.            | 121 |
| <b>41</b> | Effect of feeding different dietary levels of PBM on chemical composition (%) of broiler chicks meat.  | 123 |
| <b>42</b> | Analysis of variance for the effect of feeding different dietary levels of PBM on chemical composition (%) of broiler chicks meat.                 | 123 |
| <b>43</b> | Effect of feeding different dietary levels of PBM on the economic efficiency of experimental diets.  | 125 |
| <b>44</b> | Live body weight ( $g \pm SE$ ) of broiler chicks fed different dietary levels of PHM at different ages of the experimental period.                | 128 |
| <b>45</b> | Analysis of variance of live body weight (g) of broiler chicks fed different dietary levels of PHM at different ages of the experimental period.   | 128 |

| <b>No of Table</b> | <b>Title of Table</b>  | <b>Page</b> |
|--------------------|--|-------------|
| <b>46</b>          | Weight gain ( $g \pm SE$ ) of broiler chicks fed different dietary levels of PHM at different experimental | 131         |

|           |  |     |
|-----------|--|-----|
|           | periods.   |     |
| <b>47</b> | Analysis of variance of weight gain (g) of broiler chicks fed different dietary levels of PHM at different experimental periods.                   | 131 |
| <b>48</b> | Feed intake (g $\pm$ SE) of broiler chicks fed different dietary levels of PHM at different experimental periods.                                  | 133 |
| <b>49</b> | Analysis of variance of feed intake (g) of broiler chicks fed different dietary levels of PHM at different experimental periods.                   | 133 |
| <b>50</b> | Feed conversion (g feed / g gain) of broiler chicks fed different dietary levels of PHM at different experimental periods.                         | 134 |
| <b>51</b> | Analysis of variance of feed conversion (g feed / g gain) of broiler chicks fed different dietary levels of PHM at different experimental periods  | 134 |
| <b>52</b> | Effect of feeding different dietary levels of PHM on nutrients digestibility (%) of broiler chicks at 8 weeks of age.                              | 139 |
| <b>53</b> | Analysis of variance for the effect of feeding different dietary levels of PHM on nutrients digestibility (%) of broiler chicks at 8 weeks of age. | 140 |

| <b>No of Table</b> | <b>Title of Table</b>   | <b>Page</b> |
|--------------------|---|-------------|
| <b>54</b>          | Effect of feeding different dietary levels of PHM on carcass characteristics (%) of broiler chicks at 8 weeks of age. | 142         |

|           |  |     |
|-----------|--|-----|
| <b>55</b> | Analysis of variance for the effect of feeding different dietary levels of PHM on carcass characteristics (%) of broiler chicks at 8 weeks of age. | 143 |
| <b>56</b> | Effect of feeding different dietary levels of PHM on carcass cuts (%) of broiler chicks at 8 weeks of age.   | 145 |
| <b>57</b> | Analysis of variance for the effect of feeding different dietary levels of PHM on carcass cuts (%) of broiler chicks at 8 weeks of age.            | 146 |
| <b>58</b> | Effect of feeding different dietary levels of PHM on chemical composition (%) of broiler chicks meat.  | 148 |
| <b>59</b> | Analysis of variance for the effect of feeding different dietary levels of PHM on chemical composition (%) of broiler chicks meat.                 | 148 |
| <b>60</b> | Effect of feeding different dietary levels of PHM on the economic efficiency of experimental diets.  | 150 |
| <b>61</b> | Live body weight ( $g \pm SE$ ) of broiler chicks fed different dietary levels of DSM at different ages of the experimental period.                | 152 |
| <b>62</b> | Analysis of variance of live body weight (g) of broiler chicks fed different dietary levels of DSM at different ages of the experimental period.   | 152 |

| <b>No of Table</b> | <b>Title of Table</b>   | <b>Page</b> |
|--------------------|---|-------------|
| <b>63</b>          | Weight gain ( $g \pm SE$ ) of broiler chicks fed different dietary levels of DSM at different experimental periods. | 154         |
| <b>64</b>          | Analysis of variance of weight gain (g) of broiler  | 154         |

|           |  |     |
|-----------|--|-----|
|           | chicks fed different dietary levels of DSM at different experimental periods.  |     |
| <b>65</b> | Feed intake (g $\pm$ SE) of broiler chicks fed different dietary levels of DSM at different experimental periods.                                  | 156 |
| <b>66</b> | Analysis of variance of feed intake (g) of broiler chicks fed different dietary levels of DSM at different experimental periods.                   | 156 |
| <b>67</b> | Feed conversion (g feed / g gain) of broiler chicks fed different dietary levels of DSM at different experimental periods.                         | 159 |
| <b>68</b> | Analysis of variance of feed conversion (g feed / g gain) of broiler chicks fed different dietary levels of DSM at different experimental periods  | 159 |
| <b>69</b> | Effect of feeding different dietary levels of DSM on nutrients digestibility (%) of broiler chicks at 8 weeks of age.                              | 163 |
| <b>70</b> | Analysis of variance for the effect of feeding different dietary levels of DSM on nutrients digestibility (%) of broiler chicks at 8 weeks of age. | 164 |

| <b>No of Table</b> | <b>Title of Table</b>   | <b>Page</b> |
|--------------------|---|-------------|
| <b>71</b>          | Effect of feeding different dietary levels of DSM on carcass characteristics (%) of broiler chicks at 8 weeks of age. | 166         |
| <b>72</b>          | Analysis of variance for the effect of feeding  | 167         |

|           |   |     |
|-----------|---|-----|
|           | different dietary levels of DSM on carcass characteristics (%) of broiler chicks at 8 weeks of age.                                     |     |
| <b>73</b> | Effect of feeding different dietary levels of DSM on carcass cuts (%) of broiler chicks at 8 weeks of age.                              | 169 |
| <b>74</b> | Analysis of variance for the effect of feeding different dietary levels of DSM on carcass cuts (%) of broiler chicks at 8 weeks of age. | 170 |
| <b>75</b> | Effect of feeding different dietary levels of DSM on chemical composition (%) of broiler chicks meat.                                   | 173 |
| <b>76</b> | Analysis of variance for the effect of feeding different dietary levels of DSM on chemical composition (%) of broiler chicks meat.      | 173 |
| <b>77</b> | Effect of feeding different dietary levels of DSM on the economic efficiency of experimental diets.                                     | 175 |

## LIST OF ABBREVIATIONS.

|      |                                     |
|------|-------------------------------------|
| ADL  | = Acid detergent lignin.            |
| ADF  | = Acid detergent fiber.             |
| Ca   | = Calcium.                          |
| CF   | = Crude fiber.                      |
| CP   | = Crude protein.                    |
| DM   | = Dry matter.                       |
| DSM  | = Date stone meal.                  |
| DSPS | = Dehydrated soluble potato solids. |
| DTP  | = Dried tomato pomace.              |
| DTSC | = Dried tomato seed cake.           |
| EE   | = Ether extract.                    |
| FC   | = Feed conversion.                  |
| FI   | = Feed intake.                      |
| g    | = gram.                             |
| GE   | = Gross energy.                     |
| Kcal | = Kilo calorie.                     |
| LBW  | = Live body weight.                 |
| ME   | = Metabolizable energy.             |
| mg   | = Milligram.                        |
| MJ   | = Mega Joule.                       |
| NDF  | = Neutral detergent fiber.          |
| NFE  | = Nitrogen free extract.            |
| OM   | = Organic matter.                   |
| P    | = Phosphorus.                       |
| PBM  | = Potato by-product meal.           |



|                  |                              |
|------------------|------------------------------|
| PHM              | = Pea hulls meal.            |
| PKC              | = Palm kernel cake.          |
| PKM              | = Palm kernel meal.          |
| PSP              | = Potato steam peel.         |
| PWM              | = Potato waste meal.         |
| TBM              | = Tomato by-product meal.    |
| TME <sub>n</sub> | = True metabolizable energy. |
| TS               | = Tomato seeds.              |
| WG               | = Weight gain.               |
| YC               | = Yellow corn.               |