

TABLE I

PHYSICAL BALANCE (PROPORTION OF CONCENTRATES TO ROUGHAGE)
IN LAMB FATTENING RATIONS

Rufus F. Cox

Average of Seven Experiments
Kansas Agricultural Experiment Station

| 1. Lot Number | 1 | 2 | 3 |
|-----------------------------------------------|------------------|------------------|------------------|
| 2. Proportion (Concentrates to Roughage) | 35% to 65% | 45% to 55% | 55% to 45% |
| 3. Number of lambs per lot | 37 | 37 | 36 |
| 4. Number of days on feed | 106 | 106 | 106 |
| 5. Initial weight per lamb | 65.46 | 65.53 | 65.54 |
| 6. Final weight per lamb | 94.11 | 98.36 | 96.49 |
| 7. *Total gain per lamb | 28.65 | 32.83 | 30.95 |
| 8. *Daily gain per lamb | .27 | .31 | .29 |
| 9. Feed consumed per lamb daily: | | | |
| Concentrates (Grain and Supplement) | 1.01 | 1.27 | 1.46 |
| Roughage (Air Dry Basis) | 1.88 | 1.60 | 1.29 |
| 10. Feed per 100 pounds gain: | | | |
| Concentrates (Grain and Supplement) | 384.08 | 416.14 | 510.67 |
| Roughage (Air Dry Basis) | 715.19 | 530.67 | 455.32 |
| 11. Dry matter per head daily | 2.53 | 2.52 | 2.42 |
| 12. Total digestible nutrients per head daily | 1.71 | 1.78 | 1.79 |
| 13. Gain per 100 pounds dig. nutr. | 15.67 | 17.40 | 16.28 |
| 14. Required to make 100 pounds gain | | | |
| Days | 394 | 329 | 355 |
| Total digestible nutrients | 218.41 | 186.81 | 204.17 |
| 15. **Carcass grades (Packers) | | | |
| (1st grade | 37 | 41 | 50 |
| % (2nd grade | 51 | 53 | 41 |
| (3rd grade | 10 | 4 | 7 |
| (4th grade | 2 | 2 | 2 |
| 16. Dressing percent | 47.2 | 46.9 | 48.1 |

*Weighted Average

**Carcass studies are for the first
4 experiments only

TABLE II
 PHYSICAL BALANCE STUDIES WITH LAMBS FED WOOD PULP
 AND PAPER PULP

Rufus F. Cox

Average of Two Experiments
 Kansas Agricultural Experiment Station

| 1. Lot number | 1 | 2 | 3 |
|-----------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|
| | Corn Cottonseed meal | Corn Cottonseed meal | Corn Cottonseed meal |
| 2. Ration fed | (1) Prairie hay (2) Paper pulp or Wood pulp | (1) Prairie hay (2) Paper pulp or Wood pulp | (1) Prairie hay (2) Paper pulp or Wood pulp |
| 3. Ratio crude fiber to Total Digestible Nutrients | 1:3.208 | 1:3.815 | 1.4.539 |
| 4. Number lambs per lot | 15 | 15 | 15 |
| 5. Initial weight per lamb | 69.65 | 69.11 | 69.30 |
| 6. Final weight per lamb | 87.68 | 90.92 | 87.36 |
| 7. Total gain per lamb | 18.03 | 21.81 | 18.06 |
| 8. Daily gain per lamb | .16 | .19 | .16 |
| 9. Feed consumed per lamb daily: | | | |
| Corn | 1.25 | 1.25 | 1.25 |
| Cottonseed meal | .25 | .25 | .25 |
| (1) Prairie hay | .16 | .16 | .16 |
| (3) Wood or paper pulp | .324 | .222 | .181 |
| 10. Feed per 100 pounds gain: | | | |
| Corn | 801.66 | 651.88 | 780.22 |
| Cottonseed meal | 163.77 | 133.31 | 159.69 |
| (1) Prairie hay | 91.13 | 78.11 | 96.91 |
| (3) Wood or paper pulp | 255.35 | 161.68 | 147.89 |
| 11. Dry matter per head daily | 1.92 | 1.83 | 1.76 |
| 12. Total Digestible Nutrients per head daily (4) | 1.29 | 1.29 | 1.29 |
| 13. Gain per 100 pounds Total Digestible Nutrients (4) | 12.36 | 14.76 | 12.42 |

- (1) Fed in limited amounts after first 36 days of first experiment only.
- (2) Biron Groundwood Screenings or Bleached Poplar Sulphite.
- (3) Dry Weight Basis
- (4) Excluding any nutrients which might be in the pulp.

SUMMARY - PHYSICAL BALANCE STUDIES WITH LAMBS

Rufus F. Cox

In several years of experimental studies of physical balance as a factor in determining the value of lamb fattening rations, more than 2000 lambs have been fed, and a wide variety of feeds have been employed. The experimental rations have been made up of feeds ranging from high palatability and nutritive value, such as corn, cottonseed meal, and alfalfa hay, to combinations which have definitely lower nutritive value, particularly the roughages of matured grain varieties of sorghums. Among the results obtained with a high degree of consistency regardless of the year or of the type of feeds used are the following:

1. Lambs fed rations composed of approximately 45% concentrates and 55% roughage, by weight, gained more than lambs fed either a less concentrated or a more concentrated ration.
2. Rations containing less than 35% concentrates failed to fatten lambs to a desirable market finish, while those containing more than 55% concentrates, if fed for an extended length of time, produced digestive disorders and death losses. (These extreme proportions were omitted early in the experimental studies.)
3. When allowed all the feed they would eat and restricted only in the proportion of concentrates to roughage in the ration, there was little difference in either the dry matter or the total digestible nutrients consumed by lambs receiving rations varying in physical balance (concentration and bulkiness).
4. The dry matter consumption was slightly highest for lambs receiving only 35% concentrates, and the digestible nutrient consumption slightly highest for those receiving 55% concentrate in the ration.
5. The efficiency of feed utilization as measured by the gains made per 100 pounds of digestible nutrients consumed, was invariably highest for lot 2 receiving 45% concentrates and 55% roughage. Lot 3 receiving 55% concentrates and 45% roughage ranked second in this respect and Lot 1, receiving 35% concentrates and 65% roughage ranked third in efficiency of feed utilization.
6. The lambs receiving the medium proportion of concentrates to roughage graded as well alive as those receiving more grain and were apparently as satisfactory to the packer buyers. The carcasses of those receiving 55% concentrates however appeared to grade very slightly better as revealed by the Packers carcass grading.
7. In the case of the lambs fed wood pulp and paper pulp as roughage, those receiving the medium ratio of crude fiber to total digestible nutrients, corresponding to the rations composed of 45% concentrates and 55% roughage, made more efficient use of their feeds than lambs receiving less concentrated or more concentrated rations.
8. From these experiments it is concluded first, that an optimum physical balance in rations for fattening lambs actually exists; that as bulky rations are increased in concentration the gains made and the efficiency of feed utilization by lambs increase up to a certain level, and then as the concentration is further increased, the gains and efficiency of feed utilization turn downward.

Another fact which seems to be amply demonstrated by these experiments is that the weight gains made by lambs are not always positively correlated with either the dry matter intake or the total digestible nutrients consumed, but appear to follow a certain balance between these two factors determined by the crude fiber-total digestible nutrient ratio.