Poultyrmen Have Milk Problem

By H. L. Wilcke

Many poultyrmen and feed manufacturers are facing the question of high priced milk products and sometimes an actual impossibility of getting dried milk to use in their mash mixtures. Often substitutions must be made.

Among the products that poultyrmen are turning to as substitutes for the protein in the milk are soybean oilmeal, corn gluten meal and peanut meal. While these products supply protein, they do not supply the vitamins and minerals which are vitally important and which constitute much of the value of milk in poulty feeding.

Milk may be replaced if necessary in growing and laying mash, but it is not safe to replace all of it in mash for breeders, and we do not recommend that all of the milk be replaced or omitted from growing or laying mash unless it is absolutely necessary. It may be possible to supplement a mash that contains no dried milk with liquid skim milk or condensed milk. If these are available then their use helps conserve dried milk for human consumption.

If some other feed, such as soybean oilmeal, is used to replace dried milk, a part of the vitamins lost by the change may be supplied by increasing the proportion of bright alfalfa meal. This may be increased to 10 percent of the total mixture. In addition, yeast may be used to provide a part of the vitamins, but often yeast is about as expensive as dried milk.

Another newer product than soybean oilmeal, corn gluten meal and peanut meal that may be used in place of dried milk is corn distillers dried grains with solubles. It carries 28 to 30 percent protein and the water soluble vitamins that are present in the fermentation of grain by yeast. It has been used to replace part of the milk in breeder mash. and sometimes to replace all of the milk in chick starting and laying mash.

In most cases dried milk for poulty rations is still available and we expect that it will continue to be. But in some cases it has been difficult or impossible to get a steady supply of the dried product. For our layers here at the Iowa Station, we have cut down the amount of milk in their use helps conserve dried milk for human consumption.

Grain formulas for the above mash formulas:

<table>
<thead>
<tr>
<th>Protein Laying Mash</th>
<th>Protein Concentrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>112 lb.</td>
<td>144 lb.</td>
</tr>
<tr>
<td>Wheat bran</td>
<td></td>
</tr>
<tr>
<td>110 lb.</td>
<td></td>
</tr>
<tr>
<td>Pulverized whole oats</td>
<td></td>
</tr>
<tr>
<td>100 lb.</td>
<td></td>
</tr>
<tr>
<td>Ground wheat or standard wheat middlings</td>
<td></td>
</tr>
<tr>
<td>56 lb.</td>
<td>100 lb.</td>
</tr>
<tr>
<td>Alfalfa meal (bright green)</td>
<td>80 lb.</td>
</tr>
<tr>
<td>56 lb.</td>
<td></td>
</tr>
<tr>
<td>Meat and bone meal (90%)</td>
<td>60 lb.</td>
</tr>
<tr>
<td>23 lb.</td>
<td>50 lb.</td>
</tr>
<tr>
<td>Dry milk</td>
<td></td>
</tr>
<tr>
<td>46 lb.</td>
<td></td>
</tr>
<tr>
<td>Soybean oilmeal or corn gluten meal</td>
<td>80 lb.</td>
</tr>
<tr>
<td>13 lb.</td>
<td></td>
</tr>
<tr>
<td>Ground oyster shell or high grade limestone</td>
<td>30 lb.</td>
</tr>
<tr>
<td>3 lb.</td>
<td></td>
</tr>
<tr>
<td>Steamed bone meal</td>
<td>6 lb.</td>
</tr>
<tr>
<td>6 lb.</td>
<td>10 lb.</td>
</tr>
<tr>
<td>Salt</td>
<td></td>
</tr>
<tr>
<td>5 pt. Fish liver oil (80 units Vitamin D per gram)</td>
<td>20 pt.</td>
</tr>
</tbody>
</table>

Grain formulas for the above mash formulas:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>275 lb. Corn (whole shelled)</td>
<td>835 lb.</td>
</tr>
<tr>
<td>225 lb. Oats, wheat or barley</td>
<td>675 lb.</td>
</tr>
</tbody>
</table>
MANY AN IOWA farmer is aware that some day he may need to use commercial fertilizer, especially phosphate, in order to produce crops satisfactorily. He wonders, "Has that time arrived? Could I profitably increase my crop yields by applying fertilizer?"

How nice it would be if we could say to every Iowa farmer, "Yes, it undoubtedly will pay you to apply phosphate," or "No, you don't need to use phosphate fertilizer. It won't pay."

But it isn't that easy. We have sufficient information so that we may say to some farmers, "You are likely to get a good increase in yield by the use of superphosphate;" — to others, we must say, "Our tests have not shown enough increase to indicate that superphosphate applications would pay."

Results of our experiments indicate that the use of a phosphate fertilizer generally increases crop growth on some soil types, especially with certain crops, and gives no increase on some other soils. The amount of response that may be obtained on any of our soils, however, is governed to a large extent by past management. A soil to which considerable manure has been added and on which numerous clover crops have grown will not need phosphate as much as will one not so well handled.

The Iowa Station for more than a quarter of a century (since 1915) has had cooperative field test plots scattered about Iowa on most of the important soil types and in almost all parts of the state. These test plots were in farmers' fields and were farmed and handled just as were the other fields on those farms.

Certain of these plots were treated with 120 pounds of 20 percent superphosphate applied to each corn crop and each oat crop but not to the hay crop. Thus in a 4-year rotation that consisted of corn, corn, oats and clover, each acre would receive 360 pounds of superphosphate (240 pounds with the two corn crops and 120 pounds with the oats) during the 4-year period.

Since superphosphate must be well mixed with the soil in order to be of use to the crop, it was not possible to add phosphate while the land was in clover. Much of the benefit for the use of superphosphate when clover
Tomatoes showed the greatest response to phosphate fertilization of any of the plants in the greenhouse tests. In general, truck crops increased more than field crops.

is seeded is due to better stands insured by this material. Yields of clover hay are therefore greater when this fertilizer is used, not only because of more vigorous plant growth, but also because of more plants.

To check the value of superfos­phate, plots alongside those getting phosphate fertilizer were left unfertilized.

We took the results obtained on all these fields and averaged them according to soil types. Superphosphate usually brought substantial increases in yields for all crops. But the response between corn, oats and mixed hay differed, and these crops did not respond similarly on all soil types. The table, bottom of page 6 shows the results obtained.

In most instances, corn responded less than oats or mixed hay to superphosphate. Oats showed more response than corn to phosphate on all but one soil, but the percentage step-up in mixed clover-timothy hay yield was generally still larger than that of oats. The largest corn increase was about 7½ bushels per acre. On several soil types it was ½ bushel to 1 or 2 bushels an acre. If corn is worth 60 cents a bushel, and it costs $1.80 (figuring superphosphate at $30 a ton or 1½ cents a pound) for the fertilizer, a farmer with a soil type on which probably no more than a 1- or 2-bushel increase may be obtained should consider carefully whether or not to apply phosphate on corn. Oats stood in second place in response to superphosphate on 12 of the 16 soil types. They outranked both corn and clover on Grundy silt loam, but were below both these crops on Shelby loam, Webster silty clay loam and Waukesha silt loam. On only one soil, was there no increase in oat yields for the use of phosphate fertilizer—on Waukesha silt loam. Superphosphate stepped up the yield from 2 to 4 bushels per acre on many of these soils, increased it 6, 7 and 9 on several others and boosted it more than 14½ bushels on one soil type.

If oats are figured at 30 cents a bushel, the average increase in value of the yield for adding superphosphate ranged from a little better than 50 cents an acre to $4.41 an acre. Thus if 120 pounds of superphosphate had been added at a cost of 1½ cents per pound, or $1.80 an acre, in some instances it would have been a very profitable investment, in others not.

The story with the mixed clover-timothy hay is different: In every case the plots which had received superphosphate with the oats at the time the hay crop was seeded showed an increase in the amount of hay. These increases, with the hay valued at $8 a ton ranged from $1.36 to almost $7 an acre. If the increase in value of the oat crop is added to the hay crop which followed, then the argument for adding phosphate at the time of seeding the oats and clover becomes much stronger; on every one of these 16 soil types, a farmer would have lost nothing, on the average, to have added phosphate if he could do it at a cost of $1.80 an acre, and he might have increased the value.
of the oats and hay crops nearly $11.50 an acre. The lowest increased return from the hay crop alone for the addition of phosphate was $1.36 an acre—not far from the cost of the fertilizer.

Greenhouse Results

We have known for a long time that plants differed in their response to phosphorus. To find out more about their difference in response, we carried on tests over a 2-year period in the greenhouse at Iowa State College with eight different kinds of plants. These included grain, hay and truck crops.

According to these tests, it is evident that all plants do not respond equally well to superphosphate even when it is added to soils deficient in phosphorus. When superphosphate was added in liberal amounts to a deficient soil, certain plants made substantially increased growth, while other plants under identical conditions and on the same soil grew about as well without as with the superphosphate.

Apparently some plants are able to get along with small amounts of this plant food. Plants, it seems, differ both in the amount of phosphorus they require and also in their ability to get phosphorus out of the soil. In other words, phosphorus is more available to one type of plant than to another.

For our greenhouse tests we used a Clarion loam that, according to chemical tests, was low in available phosphorus. This soil was placed in pots, and 20 percent superphosphate was added at a rate of 400 pounds per acre. Half the pots got phosphorus and the other half were left as checks—unfertilized. Nitrogen and potash were added to be certain that the plants would not suffer because of a lack of these elements. In other words, we wanted to make sure that any difference in growth was due to the addition of superphosphate to this phosphate-deficient soil.

Several plants which would be representative of different groups of farm and truck crops were selected for growth in these pots. All of the plants increased in yield when superphosphate was added. The amount of response is shown in the accompanying table. These tests show that plants may be placed in three classes with respect to their response to superphosphate: 1. Those that respond very well; 2. those that respond to a medium degree; 3. those that respond only slightly.

In general, it appears that some of the truck crops are most responsive to additions of superphosphate. For instance, the tomato plants consistently gave high returns, the fertilized plants averaging 147 percent more in growth than those not fertilized. Second in response was mustard, a member of the cabbage family. Its increased growth for the addition of superphosphate was 113 percent. Lettuce was third in order of response with an increase in growth of 98 percent. Apparently these three plants require much phosphate, and it must also be easily obtained.

Some of the farm crops were
second in response. Leading the list was Sudan grass with an increase of 70 percent, followed by com with 57 percent and red clover, 46 percent. The position of corn and clover in response to phosphate was reversed in these experiments as compared with the field tests. In the field tests the increased yield of clover on the phosphate plots was probably the result in part of the increased stands. These three crops also require large amounts of phosphorus for satisfactory growth, but they do not respond to phosphate fertilizer to the extent that the truck crops do because they are good foragers.

Two grain crops—buckwheat and flax—were at the bottom of the list. They responded least to superphosphate additions. These two grain crops apparently get along with fairly small amounts of phosphorus. Some other grains probably would respond equally in similar circumstances.

The way the plants responded in the greenhouse may not necessarily mean that they will respond to the same extent out in the field. Plants in the greenhouse have optimum conditions, and results are not influenced by such factors as extreme variations in moisture, insect damage and the like. These greenhouse experiments, however, show that there is a difference in the needs of plants for phosphorus and in their ability to gather this plant food from the soil. The results we obtained are, no doubt, indicative of the maximum that might be expected.

From the experiments conducted thus far in the field and in the greenhouse we have concluded:

1. Not all plants respond equally well to phosphate fertilization even though the soil may be deficient in this element.

2. The most profitable time to apply a phosphate fertilizer is when a small grain crop is planted, and a legume is seeded with it.

3. Good returns for the use of superphosphate may be expected on some of our soil types but probably not to the same extent on others.

4. If soils have been well managed, manure applied frequently and legumes grown in regular rotation, phosphate will not be needed to so great an extent as when management is not so good.

5. In order to be certain that a phosphate fertilizer application will be of benefit a farmer should make trial applications and should have his soil tested.

A discussion of the limitations and the possibilities of chemical tests for phosphorus needs will be discussed in a later issue.

### RESPONSE OF SEVERAL CROPS TO THE ADDITION OF SUPERPHOSPHATE TO THE SOIL

<table>
<thead>
<tr>
<th>Crop</th>
<th>Percent increase for treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tomato</td>
<td>147</td>
</tr>
<tr>
<td>Mustard</td>
<td>113</td>
</tr>
<tr>
<td>Lettuce</td>
<td>99</td>
</tr>
<tr>
<td>Sudan</td>
<td>70</td>
</tr>
<tr>
<td>Corn</td>
<td>57</td>
</tr>
<tr>
<td>Red clover</td>
<td>46</td>
</tr>
<tr>
<td>Buckwheat</td>
<td>26</td>
</tr>
<tr>
<td>Flax</td>
<td>17</td>
</tr>
</tbody>
</table>

### Table: Increase in yield of corn, oats and clover-timothy hay on 16 soil types as a result of superphosphate fertilization*

<table>
<thead>
<tr>
<th>Soil type</th>
<th>Increase in fertilized plots over untreated</th>
<th>Increase in fertilized plots over untreated</th>
<th>Increase in fertilized plots over untreated</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bu. % Value</td>
<td>Bu. % Value</td>
<td>Ton % Value</td>
</tr>
<tr>
<td>Carrington loam</td>
<td>1.6 3 .96</td>
<td>7.6 14 2.28</td>
<td>.44 28 3.52</td>
</tr>
<tr>
<td>Carrington silt loam</td>
<td>2.0 4 1.20</td>
<td>7.4 13 2.22</td>
<td>.51 28 4.08</td>
</tr>
<tr>
<td>Clarion loam</td>
<td>.8 2 .48</td>
<td>3.4 6 1.02</td>
<td>.36 24 2.88</td>
</tr>
<tr>
<td>Clinton silt loam</td>
<td>1.3 3 .99</td>
<td>2.4 7 .72</td>
<td>.32 23 2.72</td>
</tr>
<tr>
<td>Grundy silt loam</td>
<td>4.0 6 2.40</td>
<td>9.3 18 2.79</td>
<td>.30 16 2.40</td>
</tr>
<tr>
<td>Grundy silt loam</td>
<td>1.1 2 .66</td>
<td>6.7 14 2.01</td>
<td>.57 25 4.56</td>
</tr>
<tr>
<td>Lamoure silt loam</td>
<td>.1 5 1.06</td>
<td>1.5 3 .24</td>
<td>.57 25 4.56</td>
</tr>
<tr>
<td>Marion silt loam</td>
<td>.5 1 .33</td>
<td>3.4 5 1.36</td>
<td>.32 23 2.88</td>
</tr>
<tr>
<td>Marshall silt loam</td>
<td>.5 1 .33</td>
<td>2.5 4 .76</td>
<td>.17 9 1.36</td>
</tr>
<tr>
<td>Muscatine silt loam</td>
<td>2.2 3 1.52</td>
<td>2.8 5 .84</td>
<td>.36 9 2.88</td>
</tr>
<tr>
<td>O’Neill loam</td>
<td>.6 1 2.06</td>
<td>4.0 8 1.52</td>
<td>.43 28 3.44</td>
</tr>
<tr>
<td>Shelby loam</td>
<td>.8 1 1.45</td>
<td>3.5 6 1.05</td>
<td>.26 14 2.08</td>
</tr>
<tr>
<td>Tama silt loam</td>
<td>.3 6 1.98</td>
<td>4.6 9 1.38</td>
<td>.46 68 3.88</td>
</tr>
<tr>
<td>Webster loam</td>
<td>3.3 6 1.98</td>
<td>4.6 9 1.38</td>
<td>.46 68 3.88</td>
</tr>
<tr>
<td>Webster silt loam</td>
<td>.7 4 4.44</td>
<td>2.1 4 .63</td>
<td>.23 13 1.84</td>
</tr>
</tbody>
</table>

*These data represent average results obtained on a number of fields over a period of years. These fields were located on farms of better than average management, consequently it may be expected that greater returns may be obtained on similar soils of average management or less. In any case the return ratio as between the various crops should be about as shown here.
IOWA FARMERS no longer look upon hybrid corn as a new fangled idea that may or may not prove practical. Ten years ago less than 1 acre out of every hundred grown in Iowa was hybrid; in 1941, probably at least 95 acres out of every hundred are hybrid.

But even though Iowa farmers have accepted hybrids as distinctly superior to the open-pollinated strains they formerly grew, they know that hybrids aren't perfect. They would like to see them improved in various ways.

And so we are often asked by farmers: "Why can't we have hybrids with higher yields, stronger stalks, earlier maturity, better shanks that won't drop their ears, more eye appeal and improvements in other ways?"

And farmers want these improved hybrids right away—this year or certainly next.

But do you know how long it takes to develop a new hybrid? Well, we have found that if the "weather man" cooperates, a new hybrid can be ready for release about 10 or 12 years after the first inbreeding is started.

Why does it take so long to develop satisfactory corn hybrids? If you will follow along in the steps of development, you may get a better idea of the problems involved and why it takes so long.

Corn hybrids are produced from good inbred lines. These lines are produced by inbreeding or self-pollination and selection. The corn used to build these new lines is the best varieties or hybrids adapted to any certain area.

When the Iowa Station and the United States Department of Agriculture began its corn breeding program at Ames in 1922, 500 open-pollinated ears representing 16 different varieties or strains were used as source material. Since then other varieties and numerous hybrids also have been used to start new inbred lines.

The first inbreeding or self-pollination is done on a large scale, often representing 1,000 or more plants which appeared desirable at the time of pollination. These are again carefully culled

In a commercial field of hybrid seed corn, the single cross parent chosen as female is detasseled before the pollen is shed. The other single cross (male parent) then provides pollen for the entire field. Seed is saved only from the detasseled rows.
Approximately 75,000 hand pollinations are made each year in the corn breeding program at Ames. This is the first work in producing hybrids.

at harvest time since many will then exhibit faults which were not apparent earlier in the season.

The ears which are considered satisfactory for further inbreeding are planted in ear to row progenies the following year. Many rows will be discarded entirely because of undesirable seedling or mature plant characteristics.

Further selfings are confined to the best plants in the best progeny rows. This process of selfing and selection is continued for 3 or 4 years. The individual plants within a line have then become highly similar, but the difference between lines is often quite striking.

The next step is to test these lines in hybrid combinations. Top crosses (inbred x variety) are usually used for this first evaluation. Often half or more of the new lines will be eliminated on the basis of this first test because of some major weakness.

Following the top-cross test the remaining lines are combined into single crosses, and again comparisons must be made for yielding ability, disease resistance and other characteristics. A further elimination of lines follows the single-cross tests, and only the best lines are made up into double crosses for the final testing.

Some idea of how difficult it is to locate a good double cross may be had from the following comparison. Twenty inbred lines may be combined to produce 190 different single crosses. These 190 single crosses can be combined to produce 14,535 different double crosses, only a few of which will be good enough to be recommended for commercial planting.

The problem becomes even more complicated when one considers that a large breeding program has not 20 but 100 or more lines for testing. Fortunately, methods have been devised for predicting double-cross performance on the basis of single-cross performance so that only a small percentage of the total number of double crosses need be made and tested.

The 10 to 12 years required to develop a good hybrid might, then, be roughly apportioned as follows: 3 to 4 years inbreeding and selection, 1 year top-cross testing, 1 year to produce single-crossed seed, 2 years of single-cross testing, 1 year to produce double-cross seed and 2 or more years of double-cross testing.

At present we are trying out a new method which provides for the testing of new material as soon as inbreeding is begun. As far as our work has gone the method appears to be quite satisfactory and offers promise of a gain in the efficiency of developing new lines and possibly some saving in time. More studies will be necessary, however, be-

### NUMBER OF PROGENY ROWS, POLLINATIONS AND YIELD TEST PLOTS IN THE CORN BREEDING PROJECT AT AMES FOR VARIOUS PERIODS.

<table>
<thead>
<tr>
<th>Periods compared</th>
<th>No. of progeny rows</th>
<th>No. of pollinations</th>
<th>No. of yield test plots</th>
</tr>
</thead>
<tbody>
<tr>
<td>1922-1926</td>
<td>9,018</td>
<td>64,200</td>
<td>3,000</td>
</tr>
<tr>
<td>1927-1931</td>
<td>9,177</td>
<td>86,000</td>
<td>19,278</td>
</tr>
<tr>
<td>1932-1937</td>
<td>19,796</td>
<td>151,786</td>
<td>26,669</td>
</tr>
<tr>
<td>1938-1940</td>
<td>10,927</td>
<td>140,000</td>
<td>30,705</td>
</tr>
</tbody>
</table>

http://lib.dr.iastate.edu/farmsciencereporter/vol2/iss4/1
fore it can be recommended as a general breeding procedure.

When hybrid corn was first introduced it was necessary only that hybrids be superior to the adapted open-pollinated varieties. New hybrids to gain commercial acceptance now must be superior to the best hybrids already available in yielding ability or some one or more of the other important characteristics.

Thus each new advance in corn hybrids is more costly in time and labor than for the period preceding. This can best be illustrated by comparing the number of progeny rows we have grown, the number of pollinations made and the number of yield test plots planted for various periods during the past 18 years. This is shown in the accompanying table.

Prior to 1939 all testing of hybrids, whether top crosses, single or double crosses, was done at Ames. This was an unsatisfactory procedure, and in 1939, eight new outlying test fields were located. This number was increased to 11 in 1940.

On the basis of data obtained during the past 2 years, this expansion in the testing program appears to be very much worthwhile. We have found that performance of hybrids at Ames is a very poor guide as to their possible behavior in such areas as northern and western Iowa. The new test fields make it possible for all testing of new material to be done in that area of the state where the hybrids may eventually be used commercially.

State Corn Yield Test Results

Results of the 1941 Iowa Corn Yield Test will be released at Iowa State College during Farm and Home Week in early February. At that time a bulletin will be issued showing the results of all entries.

“New” Soybean a Discard

Farmers in many sections of Iowa this year are being offered a supposedly “new wonder soybean” under such variety names as McClave, New London, Prolific, Bell, Ohio Champion, Illinois Champion and New Bush Soybean.

The advice of H. D. Hughes, head of the Farm Crops Subsection of the Iowa Station, is “Don’t bite.” The “new” soybean isn’t new at all, but an old inferior, discarded variety.

This variety is so much like the one called Midwest which was grown in Iowa over 20 years ago that the crops specialists cannot tell them apart. The Midwest was tested by the Iowa Station from 1916 to 1922 and was then discarded because it was inferior in yield to other varieties being grown at that time.
Kerosene and gasoline lamps can do good job if properly chosen, placed

If yours is one of the 140,000 Iowa farm homes in which the fuel oil lamp still burns, don’t sit by its feeble rays and wait for the years to bring the “high line” past your place. You may ruin your family’s eyesight in the interim.

That’s the advice of the Household Equipment Department at Iowa State College, and it’s based on a study of kerosene and gasoline lighting made both in the laboratory and in a typical farm home.

The mere fact that you have to use fuel oils doesn’t mean that you need to give up all hope of good lighting, the study proves. There is much that can be done to more adequately light the farm home without electricity—it’s mostly a matter of having a few more lamps around, selecting the right kinds, placing them properly and using certain kinds of shades.

In the first place, one kerosene or gas lamp isn’t enough in a room. And yet a study made in Nebraska some years ago showed that 82 percent of the homes included had kitchens and living rooms lighted with one lamp. Granted that there has been some improvement since then, the illumination in most fuel-lighted homes is far below standard.

To be well lighted, the average farm living room will require, of an evening, a minimum of three shaded lamps, preferably one round wick, one mantle wick and one vapor pressure lamp. One lamp should be used for general lighting and the other two placed to light intensive activities of all family members, such as reading, sewing and studying.

Providing additional lamps adds little to the cost, once the lamps are bought, because the fuel oil used is negligible—particularly when its value to health of eyes and nerves is considered.

The general lamp is necessary to take the dusk out of the corners. A room spotted with dark and light patches is hard on the eyes—makes it necessary for the eye to adjust itself constantly back and forth between light and dark.

Every room should have one vapor pressure lamp—two are too many, not because of an excess of light but because the slight singing noise of the vapor pressure lamp may begin to be irritating when doubled by the presence of two lamps. The normal person easily adjusts himself to the slight noise of one, however, after the lamp has been in use for a short period. If it’s a choice between the slight noise and good light, endure the first to obtain the second, household equipment experts advise. Vapor pressure lamps were found to give off less heat than the other types.

Whether the vapor pressure lamp used gasoline or kerosene made practically no difference in the lighting. The kerosene lamp used more fuel than the gasoline, but gasoline costs more in the first place. The important thing about this type of lamp, however, is to keep the pressure up. Vapor pressure lamps should be pumped up once or twice an evening. The amount of light decreases as the pressure goes down, although the average person reading by the lamp is unaware of the gradual change in intensity of light. Flickering of the light indicates that the pressure is down.

For the kitchen, at least two lamps are recommended—one, probably the vapor pressure, for general illumination, and the other a mantle bracket lamp. The latter should be placed approximately two feet above the work surface, out of the range of splash from dish water or cooking steam. Brackets located over the important kitchen or living room work surfaces would be a good idea, according to household equipment specialists—the bracket cost about 60 cents each—so that the lamps could be carried from place to place as the center of activity changed. Mantle bracket lamps gave the most light when placed at table level.

A shaded gasoline, mantle or round wick lamp was found to give enough light for dining if placed in the center of the table. If there is to be other activity in the dining room, however, more lamps should be added.

General illumination from one shaded lamp was found desirable for the bedroom, too. A mantle bracket lamp placed near the...
dressing table or dresser mirror provided necessary light, although such a lamp on either side of the mirror was found to be ideal, since both sides of the face were illuminated.

Hanging and floor lamps using fuel oil were found to be less satisfactory than the table and bracket combination. The shades on fuel oil floor lamps need improving. Reflectors behind lamps were found to be satisfactory only when the lamp was at eye level, and the work done very close to it. There was some glare, however.

The straight unshaded lamp is discouraged by lighting experts. If used, its purpose should be general illumination only, and it should be placed well above the eye level to avoid glare.

Shades on the lamps not only decreased glare but also increased the number of foot-candles (intensity of light scientifically measured) beneath the lamps. Shades of smaller upper diameter and larger lower diameter made more foot-candles available than shades with large holes at the top.

Shades that are white or light-colored on the inside will reflect the most light downward. Dark linings absorb light instead of reflecting it, and this is true also of decoration on light shades. For this reason, use of either dark or decorated lamp shades is discouraged. If there must be decoration, it should be only a nail band along the lower rim of the shade.

Fireproof shades would be a decided addition to the market, as far as fire hazard is concerned, household equipment staff members say. The fear some homemakers have of using vapor pressure lamps is mostly unfounded, they say—the lamps are reasonably safe if directions are followed closely. Lamps should not be set on cloth table covers

when there are children in the family, because of the possibility of a child’s tugging the cloth off the table and the lamp with it.

Newspaper accounts of fire tragedies make it seem wise to add the following rather obvious but apparently often-forgotten advice:

Fill the kerosene or gasoline lamp when it is thoroughly cold and away from the stove or open flame.

Keep the holes in burners clean and open to avoid explosion. Trim wicks and turn them down when not in use to prevent liquid from flowing out over the lamp.

Studies have shown that seeing may require 25 percent of one’s energy.

If there’s any doubt about the adequacy of light in a home, a light meter which measures in foot-candles the amount of light on a surface will serve as a guide. Most utility companies are glad to loan their light meters—it is not the type of equipment most families would want to own. Such companies in larger towns or lighting departments in large stores often have home service workers who will be glad to come into the home and help the homemaker measure her lighting adequacy.

Less than 10 foot-candles is not enough light—from 10 to 20 are needed for ordinary work. For somewhat closer work, such as washing green vegetables that might be “buggy,” more light is needed. For letter writing, reading newspapers or other material printed finely or on inexpensive paper, foot-candles should measure higher. Sewing or other tasks that are prolonged and trying to the eyes require the most light.

In too many farm homes there is but one out-dated kerosene lamp used to light a room, as at the right. Good, modern gasoline or kerosene lamps can do effective jobs of lighting as shown below.
**By DOROTHY EIDEM**

LEAVING YOUR dining table each morning, noon and evening with your hunger satisfied is no sure sign that you are well fed. Not even three bountiful meals a day, well-stocked pantries, and liberal grocery bills indicate that you and your family are eating enough of the right foods necessary for good health.

In fact, high grocery bills may give false assurance of good living. For it is not what is spent, but rather how it’s spent that determines good or poor diets. Not only poverty but also unwise selection and poor eating habits account for the malnutrition of one-third the families in the United States.

Proof that money alone does not provide good nutrition came from a recent study of the nutritional status of Iowa State College girls. The girls, most of whom were from families financially able to provide adequate diets, showed indifference or lack of information about good nutrition.

The research directed by Margaret A. Ohlson, Foods and Nutrition Department, is a part of a 5-year study of college women’s nutrition by seven midwest colleges. Physical defects caused by poor diets either before or during college were used as a check.

The condition of the teeth was considered a measure of past nutrition. Of the 366 freshmen girls whose teeth were examined, one-third, or 111, had more than 9 molars filled before college, and only 19 girls had no decayed molars. Assuming that a filled tooth means previous decay to which faulty diet may have contributed, 95 percent of these girls probably had not eaten enough tooth-building foods during their growing years.

**Found Anemic**

The hemoglobin content or “redness” of the blood was studied to determine the presence of nutritional anemia. Approximately 20 percent of 1,265 freshman girls examined were found to be anemic. Since nutritional anemia is related to diet—at least at this age level it can be relieved by proper diet—it was again concluded that some of the
girls had not eaten properly balanced diets before coming to school. Particularly disturbing is the fact that even mild anemia lowers physical efficiency and is a real hazard in child-bearing. These figures on tooth decay and anemia would not be surprising if the girls were from low-income families. However, the results are alarming when we realize that probably none of these girls has ever been actually hungry; the majority come from homes with ample means to provide wholesome food. Obviously, the only explanations for malnutrition in our “cream of the crop” must be ignorance of what to eat or else lack of interest in what is eaten.

Study of the girls’ food habits in college further proved this fact. Because 82 percent of these girls continued to have molar tooth decay during college, and because low blood hemoglobin tended to remain low, the adequacy of the college diet was questioned. Studies were made of the dining hall food served to the girls—it was found to be completely adequate. However, the food the girls actually ate was only about half adequate. Evidently, the girls did not eat the right foods even when they were placed before them.

Good nutrition for these college girls, then, was not a problem of money, but of taste and training. For instance, they did not eat vegetables, eggs and whole grain cereals, three foods which are among the best sources of iron and vitamin B—the very nutrients which prevent nutritional anemia.

Their Families, too

But we must not criticize the coeds too severely for their apparent lack of judgment at meal time. Evidently their families did not eat enough vegetables, eggs and whole grain cereals, either. In fact, many Iowa farm families have similar nutritional lacks.

If our poorly chosen or one-sided diets always advertised themselves through tooth decay, anemia, rickets, scurvy, pellagra or other “deficiency diseases,” we could see how few of us are well-fed. However, there are less distinct signs of malnutrition. We all know people with no pep, no zest for work, chronic fatigue, digestive upsets, aches and pains, all of which may result from lack of minerals and vitamins. Ignorant of the cause, we drag on day after day, never realizing that perhaps if our breakfasts, lunches and dinners were better balanced, we’d feel more like working and playing.
What does “balanced” mean? Simply that our three meals a day will give us the energy, protein, minerals and vitamins which experts have spent years proving we need. We can get along without some of the essential nutrients for months before something really goes “haywire.” However, deficiencies may all the while be taking their toll of our dispositions and outlooks on life.

Some foods are more important than others—foods rich in vitamins, minerals and protein protect against dietary diseases and are called “protective foods.” Listed as our guardians of good health are milk, cheese, eggs, vegetables, fruits, and whole grain cereals and flours. If we eat enough of these common foods we can be fairly sure we aren’t robbing ourselves. Nutritionists tell us that the American people are most often deficient in certain minerals and vitamins, but they also tell us that the foods which supply generous amounts of the often-deficient foodstuffs also furnish the other nutrients.

An easy way to plan a daily adequate diet for an adult is to build it around the following:

**Basic Adequate Diet**

- Milk—1 pint (2 cups) or more
- Egg—1
- Meat, fish or poultry—1 average serving
- Potato—1
- Succulent or green vegetables—2 generous servings

Many homemakers find canned food left on the shelf at the end of the year. Setting a week’s supply of various foods out on a table helps make them disappear.
Fruit—2 generous servings (including one serving of citrus fruit or tomatoes)
Whole wheat bread—3 slices
Whole grain cereal other than bread—1 serving
Liver at least once a week

This list furnishes plentiful protein, minerals and vitamins for any grown-up—not enough calories for a day’s work, but desserts, fats, beverages, and perhaps more fruits and vegetables will add those.

Now let’s see just what essential substances are supplied by a “complete” diet. First of all is PROTEIN, necessary for the growth and repair of body tissues. Adults need new protein daily to replace worn-out tissues (even our skin wears away gradually). Protein is furnished in the above “Basic Diet” by the milk, egg, meat, fish, poultry, liver, and whole grain cereals and breads. Other rich sources are cheese, dried peas and beans. If the budget doesn’t allow meat every day, dried peas and beans, cheese or more whole grain cereals, usually less expensive than meat, can be substituted keeping in mind, however, that protein from animal foods is better than vegetable.

MINERALS are essential to normal structure and processes of the body. Fortunately for us, the majority of the 14 necessary minerals are quite plentiful, so that an ordinary mixed diet, unless too highly refined, will usually furnish a safe surplus. For instance, salt for seasoning more than provides sodium and chlorine needed. The average family, however, is likely to lack calcium, iron and iodine, especially calcium.

Use Up Calcium

CALCIUM gives bones and teeth their firmness. Small amounts are necessary for the normal action of the heart muscle and for the clotting of the blood. Although children, because of rapid growth, need calcium in larger amounts, adults also need it for their bones and teeth, because the calcium in bones and teeth is not permanently deposited. We use up and excrete calcium each day, and we don’t consume enough to take care of daily losses. Thus the body gradually drains the mineral from the bones and teeth. This explains why a “tooth for every child” once was considered the inevitable result of motherhood. Calcium lacking in old people may result in weak bones and slow-healing fractures. Our only rich source of calcium is milk—also milk products such as cheese, buttermilk, dried, evaporated, malted and condensed milks. Fairly good sources are: Green leafy vegetables, dried fruits and molasses. Milk is preferred not only because it contains much calcium but also because the calcium in milk is better utilized by the body.

IRON is the blood-building mineral which makes blood red. The iron in the blood enables us to be strong and vigorous by carrying the air we breathe to every cell of the body. Lack of iron in the blood is called “anemia.” We work with less power, we’re slowed down, and when we do work we tire easily; our resistance to infection is lowered and we lack pep. Although there are several causes of anemia which label it mainly a medical rather than a dietary problem, there is one type—nutritional anemia—which can be prevented by proper diet. The presence of nutritional anemia in the college girls studied at Iowa State, with its symptoms of decreased vitality, fatigue and low resistance, was one of the evidences of faulty diets.
Liver for Iron

Going back to our basic diet, iron will be furnished by the meat, liver, egg, green leafy vegetables, and the whole grain bread and cereal. In meats, the ones which contain large amounts of blood are good sources. Thus, beef muscle is a better source of iron than pork, veal or lamb. Meat specialties—liver, tongue, heart and kidneys—are still better than muscle. Liver, the richest source of iron, is recommended at least once a week. Other good sources of iron are found in legumes (peas and beans), molasses and dried fruits (apricots, peaches and prunes). Because minerals are in the bran of grains, white flour has only one-third as much iron as whole wheat flour. “Enriched” white flour has iron added.

IODINE is the fourth mineral commonly lacking. Its deficiency causes simple goiter—swelling of the thyroid gland in the neck. In the so-called “goiter belt” states of the Great Lakes, Pacific and Northwest regions—the iodine-poor soil grows iodine-poor vegetables. Although seafood is a good source of iodine, an easy preventative measure against goiter is the use of iodized table salt.

VITAMINS, except for abnormal cases, should come from the garden or the grocery, instead of the drug store. First of all, vitamins from foods cost less than in their purified or concentrated forms. Secondly, although we know of many nutrients essential for growth and good health, there may be still other vitamins which are equally essential but which have not, as yet, been discovered.

Eat Large Variety

With vitamins, just as with minerals, if we obtain the ones most often deficient and obtain them from a large variety of natural foods, we can be reasonably certain to have every vitamin.

Vitamin A is essential for good health, normal growth, tooth formation, vigor and resistance to infections. Lack of vitamin A causes night blindness, a condition of the eyes which cuts down our visibility in half darkness or upon sudden changes in light. How much you need depends upon your size. Vitamin A, although stored in the liver must be provided each day to assure good health. In our list of protective foods, milk, egg yolk, liver and green leafy vegetables supply ample vitamin A. Usually the presence of green or yellow colors in vegetables means that those vegetables contain carotene, the pro-vitamin A which the liver changes to vitamin A.

Helps Body “Breathe”

Vitamin B or thiamin is necessary for growth and for the good health of nerves, muscles, and digestive system. Its main work is in helping the body “breathe.”

Calories determine vitamin B requirements. The more we eat the more vitamin B we need. Nervousness, digestive disturbances, fatigue, poor appetites and constipation may result from insufficient vitamin B. Meats, especially pork muscle, liver and kidney, whole grain cereals and flours, yeast, wheat germ, peas, beans and nuts are good sources. Least expensive are the whole grain cereals and breads. “Enriched” flour has vitamin B added.

Vitamin C cements cells together. A total lack of vitamin C causes scurvy, a disease characterized by hemorrhages, swollen joints and gums. More commonly diets poor in vitamin C result in sallow, muddy complexion, loss of energy, anemia, or fleeting pains in the joints and limbs, especially the legs—sometimes mistaken for rheumatism. The so-called growing pains of young children may be due to a lack of vitamin C and may really be a sign of scurvy. Babies often exhibit mild scurvy through lack of appetite, failure to gain, intestinal disturbances, petulance, pain in muscles and joints shown by dislike in being picked up from the crib.

On the other hand, sufficient vitamin C helps us resist infections, prevents tooth decay and keeps our bodies in buoyant health. Best sources are citrus fruits (oranges, lemons and grapefruit) and tomatoes. Next best are fresh berries, fresh green leafy vegetables and growing shoots. Raw fruits and vegetables are better sources than cooked ones, for heat destroys vitamin C. Tomatoes and potatoes, however, lose little during cooking. Incidentally, potatoes may be an important source if consumed in large quantities.

Sun “Generates” D

Without vitamin D the bones and teeth are not properly formed. Lack in children causes rickets, of which bow legs, flabby muscles, paleness, and irritability are common signs. One best source of this vitamin is the sunshine which generates vitamin D under our skins. However, during cloudy seasons D must be supplied by foods. This vitamin is commonly provided only in fish liver oil—cod-liver is the most practical standardized source. Few other foods contain vitamin D—only egg yolks, milk and butter, and even they are not reliable sources.

If the foods described above are included in the daily diet, the normal adult should not only have good nutritional health but should also live longer. Old people may need less of each, but do need all the elements. Children, because of rapid growth, need proportionately more protein, vitamins and minerals than their parents—for example, a child needs twice as much milk (1 quart) daily to satisfy his calcium needs. Adolescents may need even more—up to 2 quarts daily.

Homemakers who work wide varieties of foods into their meals are most likely to feed their families well—eating many kinds of vegetables, many kinds of fruits and meats, will help insure presence of all the necessary food nutrients.