## S1.Q4: What is the suggested maximum level of synthetic L-lysine that should be used for each phase of growing and finishing?

The maximum level of synthetic L-lysine that should be used is the same, whether or not a minimum SBM level is set. These have been determined in practice for each phase of growth, and are shown in the table below. The number of feeding phases is greater than some systems use but can be reduced according to need.

The maximum limits for synthetic lysine are often exceeded, especially in pig weights of 200 lbs. or more. Feed invoice is a driving force, but skilled nutritionists have studied the consequences of exceeding the limits on both growth and feed conversion. With the new understanding, the suggested minimum SBM levels should only be applied under conditions of (1) summer heat stress or (2) when respiratory disease stress is a persistent problem. They do not apply to fall diets unless respiratory disease is a problem (e.g., influenza).

Minimum levels of SBM for heat stress were established by a large commercial system, since this normally represents the biggest profit opportunity (see Section 3, Q1). A specific and lower recommendation has also been provided for when respiratory stress is an issue (see Section 2, Q2). In each case, there is a significant benefit to carcass weight gain; FCR is also markedly improved during respiratory stress. Typical diets use too much DDGS and/or synthetic lysine; they displace SBM and the natural growth- and health-promoting functional bioactive compounds that it contains.

### Maximum Synthetic L-Lysine Levels by Phase of Growth to Prevent Performance Loss

| Diet Name | Start WT lbs/pigs | End WT lbs/pig | Max Lys. HCl lbs/ton |
|---|---|---|---|
| Diet 25-50 | 25 | 54 | 12.5 |
| Diet 1 | 54 | 79 | 12.0 |
| Diet 2 | 79 | 101 | 11.0 |
| Diet 3 | 101 | 122 | 10.0 |
| Diet 4 | 122 | 159 | 8.0 |
| Diet 5 | 159 | 191 | 7.0 |
| Diet 6 | 191 | 220 | 6.0 |
| Diet 7 | 220 | MKT | 5.0 |

## S1.Q5: Why should a minimum amount of SBM be included in growing and finishing diets when synthetic amino acids can be less expensive?

With the economic competitiveness of synthetic amino acids over the past decade, significantly higher levels have been used in swine diets, resulting in less predictable performance results. Exceeding maximum recommended levels of L-lysine HCl (and consequently not meeting recommended soybean meal/crude protein levels), particularly in late-finishing pigs (e.g., 180–300 lbs), can severely compromise growth and feed efficiency. SBM provides important functional bioactive compounds, as well as the proper balance of essential amino acids. Recent evaluations in a large production system indicated performance improvements when using minimum SBM levels in the summer months, which reduced the summer weight dip. Functional bioactive compounds contained in SBM have also provided performance improvements during health-challenged periods of the year (e.g., Jan–April).

### S3.Q2: What are the major differences between summer and non-summer feeding programs related to SBM constraints?

The summer program involves a suggested minimum SBM and maximum DDGS content to minimize or prevent the carcass weight dip (see S3.Q1). The DDGS restriction is important because there is a dose-related reduction in feed intake, irrespective of source. However, a certain but greatly reduced level of DDGS is important to gut health. Growing and finishing pigs will consume 4%–8% less feed due to heat, and dietary fiber reduces intake even further. The diet matrix shown in S3.Q1 consists of corn, higher levels of SBM, some DDGS for gut health and no fat. Increasing amino acid levels is often recommended to compensate for reduced feed intake; however, research has not proven this to be beneficial, unless amino acids are already below their required levels.

Recent changes in the cost of fats and oils have made it more difficult to justify the use of these ingredients based on benefit-over-feed cost. The SBM diet matrix eliminates the need for fat. To reiterate, the most important factor in carcass growth recovery is to not reduce feed intake in the first place.

### S3.Q3: When should a summer feeding program be started?

Due to ambient temperature differences, the various "effective temperature" comfort ranges for each phase must be considered. In the Corn Belt region, putting summer diets in place by May and continuing through the month of September is recommended. In warmer regions, such as the Southeast and Southwest, putting summer diets in place in April may be more appropriate.

A mitigating factor is swine respiratory disease (SRD) prevalence. If producers have experienced a winter/spring challenge, then a carcass weight decline can emerge before it gets hot enough to reduce feed intake. This early start of carcass weight decline due to SRD becomes a calibrating factor for beginning the summer minimum SBM program to promote carcass growth. For example, in the Midwest, April may be a prudent choice to avoid creating a carcass weight dip that is difficult to overcome economically.

### S3.Q4. Is there a different effect of SBM on gilts and barrows (and boars) in the summer-heat time?

A gender-by-season interaction has not been observed, but barrows will consistently consume more feed and grow faster than gilts. Boars have a higher protein accretion rate and lower feed intake in the early growth phases; thus, they will require higher amino levels (15%–25%) than barrows.

## Section 4: Economics

### S4.Q1: What is the preferred method to assess the financial aspects of a swine feeding program?

Each system varies slightly in the methods used to assess the financial impact of their feeding program. Many times, income over feed costs is used, but the full analysis of all costs and revenue is crucial. For example, housing costs may be impacted by a more rapid growth rate (space shortages) so must be included. Various aspects of revenue will be impacted if the variation and percentage of full value pigs is considered. A complete evaluation of all feeding and production costs, including all sources of revenue, is suggested. The preferred method is calculating the net-profit-per-pig of a swine feeding program.

## S4.Q2: What are the shortcomings of using "income over feed costs" or "feed cost per lb of gain" when making financial decisions?

Often, nutritionists will use "income over feed costs" and "feed costs per lb of gain" as their financial measure of success. These methods typically overlook packer pricing factors — e.g., sort losses, lean premiums, group uniformity and leverage effects of heavier market weights. The shortcoming of using either one is knowing whether a particular system is fixed-time or fixed-weight, as the economics are different for each. In addition, neither metric alone fully accounts for the profit achieved on a per-pig basis.

## S4.Q3: What is the additional economic value of using minimum soybean meal (SBM) levels rather than least-cost formulas using maximum levels of crystalline amino acids?

The primary benefit of using a minimum SBM level in formulations occurs during the summer, when it minimizes or eliminates the summer carcass weight dip. Extreme displacement of SBM by a higher fiber ingredient such as distillers' dried grains with solubles (DDGS) or corn germ meal reduces carcass weight gain. The second benefit tends to be in the winter months when barns are closed and respiratory diseases become a problem. When target carcass weight can be achieved with the typical diet, the analysis depends on ingredient costs and when SBM is used at higher levels. Under this scenario, maximum synthetic lysine levels are set only by dietary phase.

A recent comparison of costs and revenue for two different feeding programs aimed at optimizing carcass weight gain during the summer months — where one held a minimum SBM content and the other purely least-cost-formulated — indicated that after feed costs, carcass weight and mortality income were incorporated, the return per head was $2.99 greater when SBM minimums were enforced. The cost assumptions used were $5.96/bu corn, $400/ton SBM and $220/ton DDGS (derived from a three-year pricing history for a composite sampling of nine Midwest feed mills) and a carcass weight value of $1.00/lb. The challenge is capturing the anticipated tendencies of consistently better performance, especially in health-challenged flows or during summer months, compared to the higher feed costs.

### SBM Economic Value: $ Return/Head

| Market Prices, $/lb | Soybean Meal Cost/Ton, $ | | | | | | |
|---|---|---|---|---|---|---|---|
| | 300 | 325 | 350 | 375 | 400 | 425 | 450 |
| **0.6** | $2.89 | $2.44 | $1.64 | $0.72 | **($0.28)** | **($1.28)** | **($2.28)** |
| **0.8** | $4.52 | $4.08 | $3.27 | $2.36 | $1.36 | $0.35 | **($0.65)** |
| **1** | $6.16 | $5.71 | $4.91 | $4.00 | $2.99 | $1.99 | $0.99 |
| **1.2** | $7.80 | $7.35 | $6.54 | $5.63 | $4.63 | $3.63 | $2.62 |

Assumes a 6.8 lb carcass weight advantage for minimum SBM, maximum DDGS specifications
Assumes .6% improvement in livability for minimum SBM, maximum DDGS specifications
Accounts for the added saleable pounds due to an improvement in livability
Assumes $5.96/bu corn, $220/ton DDGS
Assumes SBM NE equal to corn