Assessing Silage Quality

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Forage crops serve as the main source of material for production of silage, while high moisture grains, although high in nutritive value, are ensiled in lesser quantities worldwide. Forage crops are more widely distributed throughout the world than any other group of crops (Musgrave & Kennedy, 1950), and their use is increasingly in harmony with the current worldwide trend towards more environmentally sensitive cropping systems. Silage use dates back to 1500 to 2000 BC. (Bolsen, 1995) and currently has widespread use throughout the world, especially in Europe (Thomas et al., 1980) and in the USA. Silage use is positively correlated with the steady rise in herd size, particularly in the USA. Although silage has been produced for centuries, only recently have techniques been developed to attempt to evaluate effects of ensiling on crop quality and subsequent animal performance. Many references in the literature to silage are actually referring to fresh forage that will be or can be ensiled. Throughout this chapter the term silage refers to a feed that is undergoing or has undergone a fermentation process.

Within the past 150 yr, the proximate analysis system was developed to quantify the nutritive value of individual feed components (Van Soest, 1994). In the middle of the 20th century in vitro and in vivo digestion methods were developed, and in the 1960s Van Soest’s fiber system was developed (Goering & Van Soest, 1970). Most analytical procedures associated with silage are quantitative procedures. An exception to this is assaying for the presence of silage toxins. The three basic steps in each analytical procedure are sample preparation, isolation of desired components from interferences, and a final measurement. The most difficult step is relating quality measurements to animal performance.

The development of techniques to assess silage quality has coevolved with several processes. These include (i) the development of improved harvesting and processing equipment, (ii) the development of storage methods and structures, and (iii) the ever-changing dietary needs of animals bred for increased production po-