

estimated yield penalty of alternative agriculture relative to conventional agriculture. All three studies agree that there would be a penalty, but they disagree considerably about the amount. We believe the literature we have reviewed supports an estimate closer to that of Oelhof than to those of CAST and Olson et al. However, the evidence on this is thin, and we consider the issue still open.

A closely related issue about which more can be said concerns the relationship between the conditions of supply of organic matter and wholesale adoption of alternative agriculture. The USDA (1978) estimated that the U.S. annually produces 856 million tons of organic wastes potentially available to agriculture. Fifty-four percent is crop residues (roots, chaff, stems and leaves), 22 percent is animal manure, and the rest is sewage sludge and wastes from food processing, other industry, logging and wood processing, and municipal wastes other than sewage sludge. About 70 percent of crop residues currently are directly returned to the soil and 25 percent is fed to animals (Poincelot, 1986). Almost 90 percent of all farm animal waste also is returned to the soil.<sup>2</sup> Much smaller amounts of the remaining 24 percent of organic wastes currently are returned to the soil, and the potential for increasing this contribution is small (Poincelot, 1986). For practical purposes, crop residues and animal wastes are the principal sources of organic wastes potentially available to agriculture.

Power and Doran (1984, p. 588) present data showing that the nitrogen

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2. Poincelot (1986) indicates that 61 percent of animal wastes are excreted in unconfined habitats, so all of this is returned to the land. He states that 73 percent of the 39 percent excreted in confined habitats also is returned to the land. In total, therefore, 89 percent of all farm animal wastes are currently returned to the land.