

The influence of management, soil and environment on soil carbon in coastal pastures of NSW

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Increases in soil carbon can confer a number of production benefits and opportunities to participate in carbon trading programs. We examined the effect of a range of management, soil and environmental factors on soil carbon stocks and forms by sampling soil at 86 sites on the east coast of NSW, Australia. These sites were selected to range from unimproved to highly improved pasture systems. Soil carbon stocks (0-30 cm) ranged from 43 to 140 t C/ha with an average of 90 t/ha. There was a strong influence of environmental (precipitation) and soil factors (clay) on soil carbon stocks. As pastures are converted from unimproved to moderately improved and highly improved systems there are modest increase in soil carbon stock. On average, the conversion of unimproved pastures to highly improved pastures resulted in an increase in soil carbon stock of 20 t/ha (a 25% increase). However, this conversion relies on substantial inputs in terms of nutrients (N, P and K), increased pasture management expertise and often in irrigation (or reliance on being in a high rainfall zone). The increase in soil C is associated with an increase in potentially mineralisable N which in turn will have production benefits. We also examined the forms of carbon by ¹³C NMR on a subset of samples to further examine carbon stocks. If farmers want to increase soil carbon, they should boost productivity by alleviating production constraints such as nutrition or moisture as part of a pasture improvement program.