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SOIL PHYSICAL QUALITY IN CROP-LIVESTOCK SYSTEMS IN A BEEF CATTLE-REARING PASTURE

QUALIDADE FÍSICA DO SOLO DE PASTAGENS EM SISTEMAS DE INTEGRAÇÃO LAVOURA PECUÁRIA PARA RECRIA DE BOVINOS DE CORTE

CAMILA CASSANTE DE LIMA[1], ISABELLA CLERICI DE MARIA[1*], ROBERTO MOLINARI PERES[2]

[1] Instituto Agronômico - IAC, Campinas, SP, Brazil. *E-mail: icdmaria@iac.sp.gov.br
[2] APTA, São José do Rio Preto, SP, Brazil.

Crop-livestock systems (CLS) using no-tillage systems have been used to reform and recover degraded pastures, allowing farmers greater profitability and improving soil health. In an experiment with the purpose to evaluate four models of CLS in rearing of cows Nellore, comparing them with the rebuilds performed in permanent pasture, soil physical attributes of quality (density-Db, microporosity-Mi and diameter weighted aggregates-DWA) were evaluated in three soil layers (0-10, 10-20 and 20-40 cm) six years after implantation. The experiment was located in the Research Unity of São José do Rio Preto/ APTA, in an Ferrasol, texture sandy / medium. The 26 ha-area was divided into 24 plots, distributed according to a randomized block design, with four replications and six treatments: (T1) permanent pasture with moderate fertilization (application of 45 kg of N / ha / year); (T2) permanent pasture with fertilizer intensive (90 kg of N / ha / year divided into two applications), and four CLS models with fertilization equal to the second treatment: (T3) one year of maize followed by two pasture; (T4) one year of corn and one of pasture, (T5) two consecutive years of corn followed by a pasture and (T6) two consecutive years of corn followed by two years of pasture. The goal was to provide information to identify environmental gains of CLS models with their long-term use. Changes were observed in the size and shape of the aggregates and the presence of roots in the aggregates. Permanent pastures (T1 and T2) form larger aggregates, at right angles, with fewer roots, while aggregates in the soil managed with CLS (T3 to T6) aggregates are smaller, rounder, with more roots and more darkened color. These observations are supported by the DWA aggregates, since the permanent pasture treatments (T1 and T2) showed higher values when compared to soils with CLS. Regarding the soil layers, there was higher aggregate stability in the surface layer (0-10 and 10-20 cm) due to the higher input of organic matter and increased soil structural arrangement given by the presence of roots. Treatments with CLS values present slightly higher Db in relation to permanent pasture maintained with moderate fertilization (Table 1). Higher Db can result from machine traffic areas. Soil microporosity, however, was lower in the soil with CLS, indicating rearrangement of the structure. Thus, CLS, regardless of the sequence or number of grain crops and pastures not significantly alter the D_b and the Mi soil in relation to the permanent pasture. The DWA was the attribute that has been shown more sensitive to changes in soil by implementation of CLS.

Table 1. Values of the diameter weighted aggregates (DWA, mm)[1] soil bulk density (D_b, g/cm³)[2] and of the microporosity of soil (Mi, m³.m-³)[3] by the treatments studied in São José do Rio Preto, SP, 2012

	DWA[1]	D_b[2]	Mi[3]	DWA[1]	D_b[2]	Mi[3]	DWA[1]	D_b[2]	Mi[3]
	0 – 10 cm			10 – 20 cm			20 – 40 cm		
T1	7.41	1.52	0.432	5.6	1.52	0.420	0.69	1.55	0.393
T2	7.07	1.57	0.436	4.3	1.62	0.364	0.60	1.56	0.379
T3	6.72	1.49	0.403	3.3	1.58	0.378	0.61	1.68	0.345
T4	6.70	1.52	0.428	3.2	1.56	0.384	0.53	1.64	0.364
T5	6.47	1.56	0.412	2.7	1.61	0.390	0.46	1.60	0.379
T6	5.91	1.53	0.399	2.5	1.58	0.376	0.32	1.61	0.356

Keywords: physical indices, no-tillage, sustainable management.
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