The backtest modification in piglet behavior test

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Abstract

The aim of presented study was to evaluate behavioral reaction to modified backtest in set of 25 piglets. The backtest was performed without holding or touching tested piglet. The backtest was repeated three times at the ages 3, 4 and 5 weeks and latency attempt to turn, number of attempts and duration test to turn were recorded. All backtest parameters were influenced by modification. Latency was shorter than in classical backtest, 7.48 s in 1st test, 6.69 s in 2nd test and 3.45 s in 3rd test on average. Number of attempts showed very low variability, most piglets did turn at first attempt (60% in 1st test, 76% in 2nd test and 84% in 3rd test). Duration correlated with latency and was shorter than in classical backtest as well. The consistency of behavior in repeated tests (Spearman rank correlation) was from 0.463 to 0.704 (P<0.05) and the repeatability (R) was higher than 0.7. High levels of consistency as well as repeatability indicate intra-individual stability of reaction and behavior to modified backtest in piglets.

Keywords: backtest, non-resistant, piglet, resistant, temperament

Introduction

Besides inter-individual variability in reaction to unknown stimulus animals shows intra-individual variability in reaction to different stimulus. Different behaviors in various situation can originate from different adaptation to various selection pressure of different stimulus. Reaction to human presence can interfere with reaction to another new or unknown stimulus (Kilgour, 1975; Boissy and Bouissou, 1988; Le Neindre, 1989; Wilson et al., 1994; Réale et al., 2000; Van Erp - Van Der Kooij et al., 2001; Olmos and Turner, 2008).

One of the tests of individual variability in behavior in piglets is the backtest, first time used by Hessing et al. (1993). Backtest is generally used for detection of coping strategies in piglets, with implications to animal breeding, management, housing and welfare (Zebunke et al., 2017). Hessing et al. (1993) put piglet in the test on its back on the table and restrained in this supine position for 60 s, while one hand was

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placed loosely over the head of the pig. Various modification of Hessing`s backtest has been used by other authors. Van Erp - Van Der Kooij et al. (2001) in test put piglet on its back and restrained in this supine position for 60 seconds with one hand placed loosely over the head of the pig and the other hand placed loosely on the hind legs. Bolhuis et al. (2003) has the right hand of the placed on the thorax of the piglet, with the left foreleg of the piglet between thumb and index and the right foreleg between index and middle finger. The left hand was placed on the hind legs, used to stretch and moved the hind legs of the piglet downward at the start of the test and during test the hand remained loosely on the hind legs. Melotti et al. (2011) performed backtest by same method as Bolhuis et al. (2003), using both hands for holding piglet, but piglet was placed on a 25 kg feed bag (l × b × h: 72 cm × 52 cm × 13 cm) covered with plastic placed on a table. Zebunke et al. (2015) were holding piglets during test with both hands, but piglet was placed on V-shaped cradle that was adjustable in width and fixed on a table. Minimal number of successive tests was 2 (Van Erp - Van Der Kooij et al., 2001; Spake et al., 2012).

The aim of presented study was to evaluate behavioral reaction to modified backtest in piglets. Modification of backtest subsist on performing test without touch or hold by human during testing.

Materials and methods

Animals and housing

This study used 25 piglets (12 females and 13 males), crossbreds Mangalitsa and large white that were born and raised in the Experimental Centre for Farm Animals of Slovak University of Agriculture in Nitra. Piglets were offspring of two sows, farrowed in commercial farrowing pens measuring 235 cm × 180 cm with crate and creep area, fully slatted floor except creep area, watering point for sow and one for piglets. Sows were fed once daily with standard feed mixture for lactating sows.

Backtest

The backtest was adapted from Hessing et al. (1993) but modified to test without holding or touching piglet. The backtest was performed by two experimenters, one in farrowing pen randomly catching the piglets and second experimenter was outside pen performing test. Piglet was rapidly turned on back and put on U shaped plastic cradle (l × b × h: 590 mm × 160 mm × 90 mm) and let in supine position. Edges of U shape cradle prevent turning to prone position immediately after releasing experimenter hands. Test began immediately after releasing pig from hands and lasted to turning piglet to prone position. Maximal duration of test was 60 seconds. After test piglet was marked with animal marker and put back in the farrowing pen. Testing U cradle was placed on the table in corridor in front of farrowing pen. All tests were recorded by digital camcorder Canon Legria HF S21. The backtest was repeated three times at the ages 3, 4 and 5 weeks (T1, T2 and T3).

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Data and statistical analyses

Behavior observations were analyzed from video files using the Noldus Observer XT 11.5 software. Lying was scored as initial state event and attempt to turn from supine position (struggling) was recorded as point event. One series of leg movement during struggling was considered as one attempt. Measured parameters were the latency (L) until first attempt, number of attempts (N) and duration to turn (D). If piglet did not turn value 60 seconds was recorded.

Basic descriptive statistics and frequency analysis were calculated. To investigate the inter-tests behavioral consistency of the 25 piglets, have been calculated Spearman rank correlations (ρ) among the backtest parameters. The repeatability of backtest behavior or recorded traits was calculated as R = s_a^2 / (s_a^2 + s_i^2), where s_a^2 = variance among individuals, s_i^2 = variance within individuals (Zebunke et al., 2015). The one-way ANOVA have been used to exam effect of test rank to difference among backtest parameters, with test number as fixed effect. All statistical calculations were performed using IBM SPSS 20.

Results and discussion

Modification to testing without holding piglet had impact to all measured parameters. Latency in presented study was from 0.3 s to 39.92 s, mean in consecutive tests was 7.48 s in T1, 6.69 s in T2 and 3.45 s in T3. This is generally shorter than report Hessing et al. (1993) (from 12 s to 35 s) and Reimert et al. (2013) (more than 34 s on average). Duration of test (time to turn) significantly correlates with latency and is shorter than in classic backtest. Type classification piglets in classical backtest is based on number of attempts. Hessing et al. (1993) classified piglet with more than two escape attempts as resistant (R), with two attempts as intermediate (I) and non-resistant (NR) with less than two attempts. Some authors classified piglets as high resistant if number of escape attempts was higher as 4, and low resistant if number of attempts was 2 or less (Van Erp - Van Der Kooij et al., 2001; Bolhuis et al., 2003; Melotti et al., 2011). In this experiment number of attempts (N) showed very low variability, because of no restriction in supine position and this parameter was omitted from other analysis. Most of piglets did turn at first attempt, 60% in 1st test, 76% in 2nd test and 84% in 3rd test.

The frequency of distributions of L, N and D backtest parameters showed unimodal distribution with less or more right skewness between 1.258 and 3.14 (Figure 1a, 1b, 1c).

Parameter L and D showed decreasing from test 1 to test 3, but difference is not significant. Shortening of time L and D and increasing of number piglet with 1st successful attempt suggests the habituation to backtest. Comparable results of frequency and decreasing trend published Zebunke et al. (2015). Hessing et al. (1993) reported increasing latency to first resistance among five tests.

The consistency of behavior in three tests was high, ρ among backtest parameters ranged from 0.463 to 0.704, all correlations were significant (P<0.05). Similar level of consistency published Van Erp - Van Der Kooij et al. (2001) as well as Zebunke et al. (2015), correlation among backtest parameters vary from 0.19 to 0.47. Hessing et al.

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(1993) published agreement in piglet type classification among five tests from 77.8% to 98%.
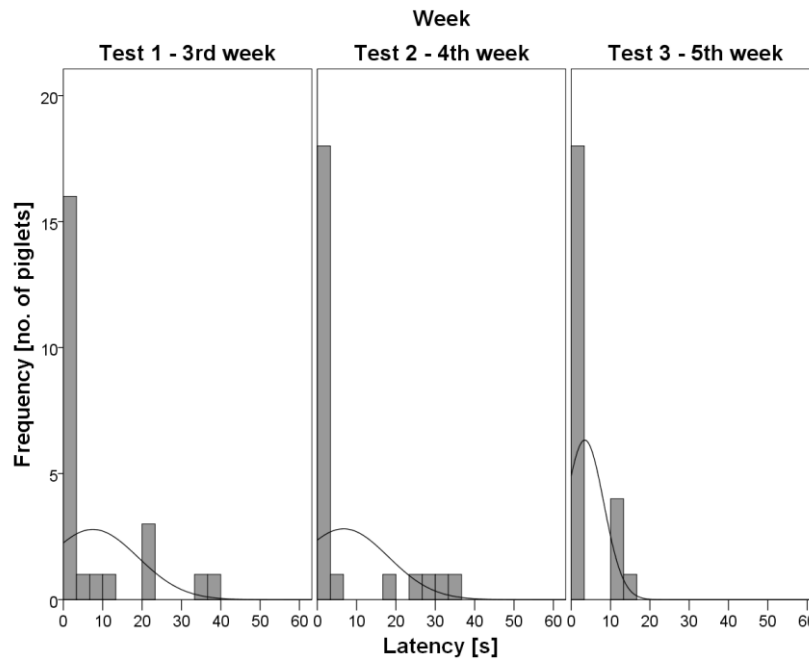

Figure 1a. Frequency distribution for latency of attempt for turning in backtest in three tests
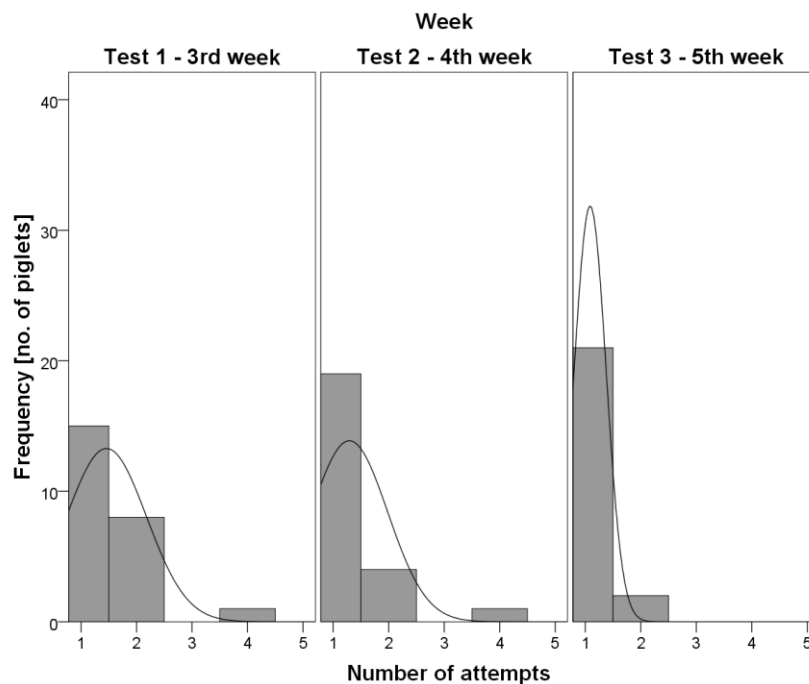

Figure 1b. Frequency distribution for number of attempts for turning in backtest in three tests

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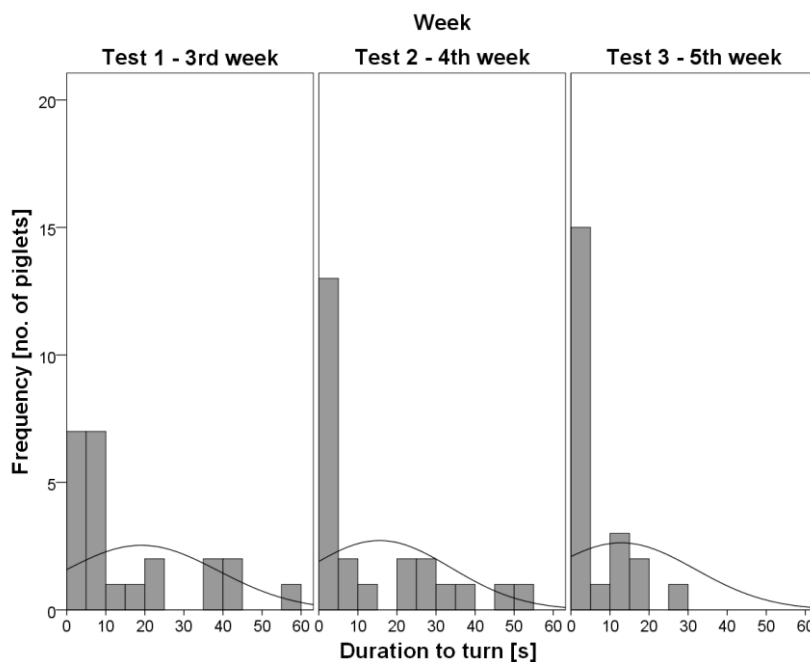
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Figure 1c. Frequency distribution for duration to turn in backtest in three tests

The repeatability of backtest parameter was very high (L R = 0.821, D R = 0.762 and N R = 0.737). Repeatability described by Zebunke et al. (2015) was only from 0.25 to 0.39, while Spake et al. (2012) published R for test duration equal 0.34 and for number of attempts only 0.13, but she calculated R by different method (repeated measures model in the PROC MIXED procedure of SAS 9.2).

Conclusions

The results of the modified backtest shows that behavior during test without restriction is moderately different from behavior during the classic test. Latency of attempt to turn is shorter and seems be the most important parameter of behavior measure. Variability and frequency of latency is similar like in the classic backtest and results of both methods are comparable. Duration of test is also affected by modification and correlate to latency. Number of attempts to turn is the most different, because without holding majority of piglets can do turn from supine position at first attempt. Consistency and repeatability of behavior in the modified backtest are very high and suggest possible use the modified backtest for individual difference evaluation in piglets and coping strategy typology.

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