NOTE: Please save this file locally before filling in the table, DO NOT work on the file within your internet browser as changes will not be saved. Adobe Acrobat Reader (available free here) is recommended for completion.

The ARRIVE guidelines 2.0: author checklist

The ARRIVE Essential 10

These items are the basic minimum to include in a manuscript. Without this information, readers and reviewers cannot assess the reliability of the findings.

Item		Recommendation	Section/line number, or reason for not reporting
Study design	1	For each experiment, provide brief details of study design including: a. The groups being compared, including control groups. If no control group has been used, the rationale should be stated. b. The experimental unit (e.g. a single animal, litter, or cage of animals).	Secs. 2.2, 2.4, 3.1 (pp. 5-13). No animal treatment/control groups; five computational baselines compared. Sec. 2.2 and Table 1 (p. 6): individual pig was the experimental unit; samples were nested within pig.
Sample size	2	a. Specify the exact number of experimental units allocated to each group, and the total number in each experiment. Also indicate the total number of animals used. b. Explain how the sample size was decided. Provide details of any *a priori* sample size calculation, if done.	Secs. 2.1-2.2 and Table 1 (pp. 3, 6): 440 pigs; 352/44/44 pigs and 2,096/449/449 samples. Sec. 2.1 (p. 3): pragmatic availability/quality screening; no a priori power calculation.
Inclusion and exclusion criteria	3	a. Describe any criteria used for including and excluding animals (or experimental units) during the experiment, and data points during the analysis. Specify if these criteria were established *a priori.* If no criteria were set, state this explicitly. b. For each experimental group, report any animals, experimental units or data points not included in the analysis and explain why. If there were no exclusions, state so. c. For each analysis, report the exact value of *n* in each experimental group.	ected by severely bent postures, jumping, motion blur, incomplete acquisition, or sensor abnormalities were excluded. These criteria were established a priori and applied before data set partitioning and analysis. Section 2.2 (p. 5): Point-cloud samples affected by severely bent postures, jumping, motion blur, incomplete acquisition, or sensor abnormalities were excluded during quality screening. s and 2,096 point-cloud samples; the validation set included 44 pigs and 449 samples; and the test set included 44 pigs and 449 samples. In total, 440 pigs and 2,994 point-cloud samples were included in the reported analyses.
Randomisation	4	a. State whether randomisation was used to allocate experimental units to control and treatment groups. If done, provide the method used to generate the randomisation sequence. b. Describe the strategy used to minimise potential confounders such as the order of treatments and measurements, or animal/cage location. If confounders were not controlled, state this explicitly.	because this was a non-invasive observational study with no control or treatment groups. For computational analysis, the dataset was partitioned at the individual-pig level into training, validation, and test sets comprising 352, 44, and 44 pigs, respectively, to prevent data leakage. s all models. Treatment-order randomisation was not applicable because no animal treatments were administered. Farm-stratified allocation and leave-one-farm-out validation were not performed or could not be verified; therefore, residual confounding associated with farm and housing conditions may remain.
Blinding	5	Describe who was aware of the group allocation at the different stages of the experiment (during the allocation, the conduct of the experiment, the outcome assessment, and the data analysis).	No animal treatment groups were used, so treatment-allocation blinding was not applicable. One trained annotator labelled all point clouds using a standardised protocol. Formal blinding of the annotator and analysts was not documented; the independent test set was used only for final evaluation.
Outcome measures	6	a. Clearly define all outcome measures assessed (e.g. cell death, molecular markers, or behavioural changes). b. For hypothesis-testing studies, specify the primary outcome measure, i.e. the outcome measure that was used to determine the sample size.	Sec. 2.4 (pp. 12-13): Acc, mIoU and B-IoU defined. N/A: no a priori sample-size calculation; outcomes were point-wise segmentation metrics (Sec. 2.1, p. 3).
Statistical methods	7	a. Provide details of the statistical methods used for each analysis, including software used. b. Describe any methods used to assess whether the data met the assumptions of the statistical approach, and what was done if the assumptions were not met.	Secs. 2.4, 3.1 (pp. 11-14): Pointcept/PyTorch; descriptive Acc, mIoU and B-IoU; no inferential tests. N/A: no inferential model/assumption tests; single-run point estimates only (Secs. 2.4-3.1).
Experimental animals	8	a. Provide species-appropriate details of the animals used, including species, strain and substrain, sex, age or developmental stage, and, if relevant, weight. b. Provide further relevant information on the provenance of animals, health/immune status, genetic modification status, genotype, and any previous procedures.	Section 2.1 (p. 3): A total of 440 Duroc × Landrace × Large White crossbred pigs were included, with body weights ranging from 25 to 150 kg. o County, Xingtai, Hebei Province. They were commercially raised crossbred pigs managed under routine farm conditions. The pigs were not genetically modified and had not undergone any previous experimental procedures.
Experimental procedures	9	For each experimental group, including controls, describe the procedures in enough detail to allow others to replicate them, including: a. What was done, how it was done and what was used. b. When and how often. c. Where (including detail of any acclimatisation periods). d. Why (provide rationale for procedures).	was used for individual identification. The point clouds were calibrated, fused, quality screened, manually annotated in CloudCompare, and used for model training and evaluation. ore daily feeding, between 06:30 and 08:30. Each pig passed through the acquisition passage two to three times, and the cameras operated at 30 frames per second. parate acclimatisation period was required because data were collected during routine passage under normal commercial farm management. Introduction and Secs. 2.1-2.3 (pp. 1-11): rationale for acquisition and boundary-aware procedures.
Results	10	For each experiment conducted, including independent replications, report: a. Summary/descriptive statistics for each experimental group, with a measure of variability where applicable (e.g. mean and SD, or median and range). b. If applicable, the effect size with a confidence interval.	method achieved an Acc of 98.65%, an mIoU of 97.36%, and a B-IoU of 88.77%. These values were obtained from single final runs; independent replications and measures of variability, such as mean ± SD or range, were not assessed. nd B-IoU were 0.55, 0.35, and 3.37 percentage points, respectively. No formal effect sizes or confidence intervals were calculated because repeated-seed experiments were not performed. The reported differences are therefore interpreted descriptively.

The Recommended Set

These items complement the Essential 10 and add important context to the study. Reporting the items in both sets represents best practice.

Item		Recommendation	Section/line number, or reason for not reporting
Abstract	11	Provide an accurate summary of the research objectives, animal species, strain and sex, key methods, principal findings, and study conclusions.	Abstract (p. 1): The research objective, key methods, principal findings, and conclusions are summarised.Point-cloud data were collected from 440 male and female Duroc × Landrace × Large White crossbred pigs at two commercial pig farms.
Background	12	a. Include sufficient scientific background to understand the rationale and context for the study, and explain the experimental approach. b. Explain how the animal species and model used address the scientific objectives and, where appropriate, the relevance to human biology.	Introduction (pp. 1-3). Introduction (pp. 1-3): pig phenotyping rationale stated; human-biology relevance not applicable.
Objectives	13	Clearly describe the research question, research objectives and, where appropriate, specific hypotheses being tested.	Introduction (pp. 2-3): objective and contributions stated; no formal hypothesis.
Ethical statement	14	Provide the name of the ethical review committee or equivalent that has approved the use of animals in this study, and any relevant licence or protocol numbers (if applicable). If ethical approval was not sought or granted, provide a justification.	Institutional Review Board Statement (p. 20): no separate approval; justification and farm permission stated.
Housing and husbandry	15	Provide details of housing and husbandry conditions, including any environmental enrichment.	aintained under routine commercial farm conditions at two participating pig farms. Point-cloud data were collected in the main passage of partitioned barns before daily feeding, between 06:30 and 08:30. The study did not alter the animals' routine housing or husbandry.
Animal care and monitoring	16	a. Describe any interventions or steps taken in the experimental protocols to reduce pain, suffering and distress. b. Report any expected or unexpected adverse events. c. Describe the humane endpoints established for the study, the signs that were monitored and the frequency of monitoring. If the study did not have humane endpoints, state this.	N/A: non-invasive observation during routine management; no added handling or intervention (p. 20). No expected or unexpected adverse events occurred during point-cloud data collection. No study-specific humane endpoints were established because the study involved only non-invasive observation and did not include experimental treatment, invasive procedures, or additional animal handling. The animals remained under routine monitoring by farm personne.
Interpretation/ scientific implications	17	a. Interpret the results, taking into account the study objectives and hypotheses, current theory and other relevant studies in the literature. b. Comment on the study limitations including potential sources of bias, limitations of the animal model, and imprecision associated with the results.	Discussion and Conclusions (pp. 18-20). Discussion (pp. 18-19): single-run, cross-farm, annotation, metric-coupling and sensitivity limitations.
Generalisability/ translation	18	Comment on whether, and how, the findings of this study are likely to generalise to other species or experimental conditions, including any relevance to human biology (where appropriate).	Discussion and Conclusions (pp. 18-20): generalisation limited to sampled farms/configurations; future validation specified.
Protocol registration	19	Provide a statement indicating whether a protocol (including the research question, key design features, and analysis plan) was prepared before the study, and if and where this protocol was registered.	No formal study protocol was registered in a publicly accessible repository. The individual-pig-level dataset split, key model configurations, and evaluation procedures were specified before final test-set evaluation and are described in Sections 2.2-2.4.
Data access	20	Provide a statement describing if and where study data are available.	Data Availability Statement (pp. 20-21): restricted data; materials available on reasonable request, subject to permission.
Declaration of interests	21	a. Declare any potential conflicts of interest, including financial and non-financial. If none exist, this should be stated. b. List all funding sources (including grant identifier) and the role of the funder(s) in the design, analysis and reporting of the study.	Conflicts of Interest (p. 21): none declared. Agriculture Innovation Consortium Project (BAIC10-2026). The funders had no role in the study design, data collection, data analysis, interpretation of the results, preparation of the manuscript, or the decision to submit the manuscript for publication.